codling wind park

Natura Impact Statement

Volume 6

In-combination Assessment - Part 1


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Abbreviations

Abbreviation	Term in full
AA	Appropriate Assessment
AESI	Adverse Effect on Site Integrity
AL	Acceptable Level
CEMP	Construction Environment Management Plan
CWP	Codling Wind Park
CWPL	Codling Wind Park Limited
EC	European Commission
ECC	Export Cable Corridor
EcIA	Ecological Impact Assessment
EDF R	Électricité de France Renewables
EDR	Effective Deterrent Range
EIA	Environmental Impact Assessment
EIA Report	Environmental Impact Assessment Report
EMF	Electromagnetic Field
EPA	Environmental Protection Agency
EU	European Union
FOS	Fred Olsen Seawind
GIS	Geographic Information System
INNS	Invasive non-native species
ISMP	Invasive Species Management Plan
JNCC	Joint Nature Conservation Committee
kV	Kilovolt
LSE	Likely Significant Effect
MAC	Maritime Area Consent
MMMP	Marine Mammal Management Plan
MU	Management Unit
NIS	Natura Impact Statement
NPWS	National Parks and Wildlife Services
NSA	Nutrient Sensitive Area
O&M	Operations and maintenance
OECC	Offshore Export Cable Corridor

Abbreviation	Term in full
ORESS	Offshore Renewable Electricity Support Scheme
OTI	Onshore Transmission Infrastructure
OWF	Offshore wind farm
QI	Qualifying Interest
SAC	Special Area of Conservation
SID	Strategic Infrastructure Development
SPA	Special Protection Area
SSC	Suspended Sediment Concentration
UXO	Unexploded Ordinance
VMP	Vessel Management Plan
WTG	Wind turbine generator
ZoI	Zone of influence

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.
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.
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 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.
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.
Onshore development area	The entire footprint of the OTI and associated temporary works that will form the onshore boundary for the development consent application.
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.
Operations and maintenance base (OMB)	The operational and maintenance facilities to support the CWP Project, including buildings / warehouses, laydown areas, cranes, parking and marine works such as pontoons for maintenance vessels.

Glossary	Meaning
Strategic Infrastructure Development	Strategic Infrastructure Development includes development which would: – contribute significantly to meeting any of the objectives of the National Planning Framework, or – 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.
Zone of Influence (ZoI)	Spatial extent of potential impacts resulting from the project.

1 INTRODUCTION

1. This document, **Volume 6 (Part 1** of **2)** provides the scientific examination of the CWP Project and examines the in-combination impacts screened into the analysis of project-only assessment of the implications for Special Areas of Conservation (**Volume 4**).

2. The NIS is laid out as follows:

- **Volume 1** contains the introduction to the CWP Project, document structure and a summary of the conclusions of the other volumes.
- **Volume 2** contains the introductory sections of the document, detailing the relevant legislation, assessment methodology, and the project description.
- **Volume 3** provides the report to inform AA Screening.
- **Volume 4** provides the scientific examination of the CWP Project on relevant European sites (Special Area of Conservation (SACs)), to identify and characterise any possible implications of the CWP Project on the integrity of European sites.
- **Volume 5** (**Part 1 and Part 2**) provides the scientific examination of the CWP Project on relevant European sites (Special Protection Areas (SPAs)), to identify and characterise any possible implications of the CWP Project on the integrity of European sites.
- This volume **(Volume 6 (Part 1 and Part 2))** provides the scientific examination of the CWP Project and examines the in-combination impacts screened into the analysis of project-only assessment (**Volume 4 and 5**).

3. This volume is structured to give a scientific consideration of potential impacts each 'screened in' European designated site, drawing on the conclusions presented in **Volume 3.** Each section in this volume initially provides a summary of the conclusions for the site, through reference to the Conservation Objectives and potential impact pathways, before then providing a detailed QI by QI impact assessment. **Section 2** provides an overview of the approach taken in the in-combination assessment. **Section 3** presents this detailed examination and analysis in a site by site structure to allow the reader to understand the implications for each site.

2 APPROACH TO IN-COMBINATION ASSESSMENT

4. Step 1 of the in-combination assessment process involved establishing the long list of other development with the potential to result in in-combination 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 Offshore Wind Farm (OWF) projects.

5. The long list of other plans and programmes (presented in **Appendix 5.1 Cumulative Effects Assessment Methodology** of the EIAR) was then subject to additional screening criteria to establish a short list of other development for each European Site. Each plan or project considered alongside the CWP Project has been assigned to a tier, reflecting their current status in the planning and development process.

6. The purpose of the tiered approach is to give consideration to the level of certainty that a plan or project will be built and therefore contribute to in-combination effects. For example, there can be greater certainty that other developments approved and under construction are likely to contribute to in-combination, whereas other developments at early phases of development (i.e. pre-planning) are less likely to proceed to construction and contribute in-combination.

7. The proposed tiering structure is presented in **Table 2-1** Tiered structure for other plans and programmes considered (modified from PINS Advice Note 17 (PINS, 2019))

8. and described in more detail in **Appendix 5.1 Cumulative Effects Assessment Methodology** of the EIAR. The tiers are listed in descending order of level of detail likely to be available (and, correspondingly, certainty of effects arising).

Table 2-1 Tiered structure for other plans and programmes considered (modified from PINS Advice Note 17 (PINS, 2019))

Tier	Description
Tier 1	• Constructed projects with a continuing effect*; • 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	• Offshore projects in receipt of a Maritime Area Consent (MAC) and an Offshore Renewable Energy Support Scheme (ORESS) contract.
Tier 2b	• Offshore projects in receipt of a MAC; • Offshore Projects in the public domain where an EIA scoping report has been issued; and • Onshore Projects in the public domain where an EIA scoping report has been issued.
Tier 3	• 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 EXAMINATION AND ANALYSIS OF POTENTIAL IMPACTS ON EUROPEAN SITES – CWP PROJECT IN-COMBINATION WITH OTHER PLANS AND PROJECTS

9. The following sections provide a detailed scientific examination of the potential for adverse effects for the CWP Project in-combination with other plans and projects.

3.1 South Dublin Bay SAC

10. The following other plans and projects (**Table 3-1**) are considered as part of the in-combination assessment for South Dublin Bay SAC.

Table 3-1 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Arklow Bank OWF Phase 2 (CEA-0004)	9.8	9.9	2b
Arklow Bank Wind Park off coast of County Wicklow – Site Investigation(s) (CEA-2752; CEA-2753)	9	17	1
Banba Wind Ltd., Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Braymore Point – Site Investigations (CEA-2742)	53	27	1
Codling Wind Park Ltd. Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2748)	0	0	1
Dublin Array OWF (CEA-0037)	2.8	2	2a
Dublin Port Capital Dredging Project(s) (CEA-0206 – CEA-0210)	31.5	0.5	1
Dublin Port Company Site Investigations (CEA-2727)	29	0.2	1
Hibernian Wind Power – Kilmichael Point – Site Investigations (CEA-2756)	25	34.5	1
Lir Offshore Array Ltd., Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA2745)	48	37	1
Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
MaresConnect Electricity Interconnector Site Investigation(s) (CEA-2749)	30	9.5	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
(Dublin Port Company) MP2 Project (CEA- CEA-1323)	31.6	0	1
MP2 Project: Jetty development (CEA-1328on / off)	32.1	4	1
North Irish Sea Array (NISA) Site Investigations (CEA-2738)	40	22.5	1
North Irish Sea Array OWF (CEA-0094Off)	40.8	23	2a
Rockabill Cable Systems Ltd – site investigations (CEA-2732)	42	17	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Sure Partners Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sure Partners Site Investigations at Arklow Bank (CEA-2736)	9	17	1
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Irish Mussel Seed Company – Aquaculture	35	43.7	1
Dublin City Council, Environmental survey and ground investigation (CEA-2996)	1.5	34	1
Kish Offshore Wind Limited & Bray Offshore Wind Limited, Port and harbour activities (including capital and maintenance dredging) and port development. (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd, geophysical and site investigation surveys, Portmarnock (CEA-2991)	34	8	1
Microsoft Ireland Operations Ltd, geophysical and site investigation surveys, Dublin Port (CEA-2989)	30	0	1
Iarnród Éireann, Geotechnical and Geophysical site investigation survey (CEA-2993)	2	28	1

11. It is not considered that there is any other plan or project that could act on this European site in-combination with the CWP project at a level which could impact the attributes and targets of the Conservation Objectives such that it may lead to an in-combination adverse effect on site integrity (**Table 3-2**).

Table 3-2 Conservation objectives for the South Dublin Bay SAC and summary of associated assessment of the CWP Project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
Mudflats and sandflats not covered by seawater at low tide [1140] *Conservation Objective: To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in South Dublin Bay SAC, which is defined by the following list of attributes and targets:*				
Habitat area. The permanent habitat area is stable or increasing, subject to natural processes.	Direct impacts on habitats Increased Suspended Sediment Concentration (SSC) and Sediment Deposition Remobilisation of contaminated sediments Introduction of Invasive non-native species (INNS) Presence of Electromagnetic Field (EMF) / temperature changes Operation and Maintenance (O&M) See **Section 3.1.1**	Construction Environment Management Plan (CEMP) including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI (Adverse Event of Special Interest). No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
Community extent. Maintain the extent of the *Zostera*-dominated community, subject to natural processes.	Direct impacts on habitats Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS Presence of EMF / temperature changes (O&M) See **Section 3.1.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Community structure: *Zostera* density. Conserve the high quality of the *Zostera*-dominated community, subject to natural processes	Direct impacts on habitats Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS Presence of EMF / temperature changes (O&M) See **Section 3.1.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
Community distribution. Conserve the following community type in a natural condition: Fine sands with *Angulus tenuis* community complex.	Direct impacts on habitats Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS Presence of EMF / temperature changes (O&M) See **Section 3.1.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Annual vegetation of drift lines [1210] *Conservation Objective: To restore the favourable conservation condition of Annual vegetation of drift lines in South Dublin Bay SAC, which is defined by the following list of attributes and targets[1]:*				
Habitat area. Area increasing, subject to natural processes, including erosion and succession.	Direct impacts on habitats Introduction of INNS See **Section 3.1.2**	INNS mitigation measures will be implemented.	Following the implementation of INNS mitigation measures, there is no potential for adverse effects on the integrity of the site. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-

[1] From North Dublin Bay SAC: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000206.pdf

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
				combination with other plans and projects
Habitat distribution. No decline, or change in habitat distribution, subject to natural processes.	Direct impacts on habitats Introduction of INNS See **Section 3.1.2**	INNS mitigation measures will be implemented.	Following the implementation of INNS mitigation measures, there is no potential for adverse effects on the integrity of the site. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Physical structure: functionality and sediment supply. Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Direct impacts on habitats Introduction of INNS See **Section 3.1.2**	INNS mitigation measures will be implemented.	Following the implementation of INNS mitigation measures, there is no potential for adverse effects on the integrity of the site. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Direct impacts on habitats Introduction of INNS See **Section 3.1.2**	INNS mitigation measures will be implemented.	Following the implementation of INNS mitigation measures, there is no potential for adverse effects on the integrity of the site. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation composition: typical species and sub-communities. Maintain the	Direct impacts on habitats	INNS mitigation measures will be implemented.	Following the implementation of INNS mitigation measures, there is no potential for adverse effects on the	No impediment to the Conservation Objective being met, and following

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
presence of species-poor communities with typical species: sea rocket (*Cakile maritima*), sea sandwort (*Honckenya peploides*), prickly saltwort (*Salsola kali*) and oraches (*Atriplex spp*.)	Introduction of INNS See **Section 3.1.2**		integrity of the site. No mitigation required for other Impacts	mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation composition: negative indicator species. Negative indicator species (including non-natives) to represent less than 5% cover	Direct impacts on habitats Introduction of INNS See **Section 3.1.2**	INNS mitigation measures will be implemented.	Following the implementation of INNS mitigation measures, there is no potential for adverse effects on the integrity of the site. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Salicornia and other annuals colonising mud and sand [1310] *Conservation Objective: To restore the favourable conservation condition of Salicornia and other annuals colonizing mud and sand in South Dublin Bay SAC, which is defined by the following list of attributes and targets[2]:*				

[2] From North Dublin Bay: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000206.pdf

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
Habitat area. Area stable or increasing, subject to natural processes, including erosion and succession.	Direct impacts on habitats Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS Presence of EMF / temperature changes (O&M) See **Section 3.1.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Habitat distribution. No decline, or change in habitat distribution, subject to natural processes	Direct impacts on habitats Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
	Presence of EMF / temperature changes (O&M) See **Section 3.1.1**			
Physical structure: sediment supply. Maintain, or where necessary restore, natural circulation of sediments and organic matter, without any physical obstructions	Direct impacts on habitats Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS Presence of EMF / temperature changes (O&M) See **Section 3.1.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Physical structure: creeks and pans. Maintain creek and pan structure, subject to natural processes, including erosion and succession	Direct impacts on habitats Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
	Presence of EMF / temperature changes (O&M) See **Section 3.1.1**			
Physical structure: flooding regime. Maintain natural tidal regime	Direct impacts on habitats Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS Presence of EMF / temperature changes (O&M) See **Section 3.1.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Direct impacts on habitats Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
	Presence of EMF / temperature changes (O&M) See **Section 3.1.1**			
Vegetation structure: vegetation height. Maintain structural variation within sward	Direct impacts on habitats Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS Presence of EMF / temperature changes (O&M) See **Section 3.1.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation structure: vegetation cover. Maintain more than 90% of area outside creeks vegetated	Direct impacts on habitats Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
	Presence of EMF / temperature changes (O&M) See **Section 3.1.1**			
Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009)	Direct impacts on habitats Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS Presence of EMF / temperature changes (O&M) See **Section 3.1.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation structure: negative indicator species – *Spartina anglica.* No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	Direct impacts on habitats Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
	Presence of EMF / temperature changes (O&M) See **Section 3.1.1**			
Embryonic shifting dunes [2110] *Conservation Objective: To restore the favourable conservation condition of Embryonic shifting dunes in South Dublin Bay SAC, which is defined by the following list of attributes and targets[3]:*				
Habitat area. Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: North Bull – 2.64 ha; South Bull – 3.43 ha.	Direct impacts on habitats Introduction of INNS See **Section 3.1.2**	INNS mitigation measures will be implemented	Following the implementation of INNS mitigation measures, there is no potential for adverse effects on the integrity of the site. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Habitat distribution. No decline or change in habitat distribution, subject to natural processes.	Direct impacts on habitats Introduction of INNS See **Section 3.1.2**	INNS mitigation measures will be implemented	Following the implementation of INNS mitigation measures, there is no potential for adverse effects on the integrity of the site. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects

[3] From North Dublin Bay: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000206.pdf

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
Physical structure: functionality and sediment supply. Maintain the natural circulation of sediment and organic matter, without any physical obstructions	Direct impacts on habitats Introduction of INNS See **Section 3.1.2**	INNS mitigation measures will be implemented	Following the implementation of INNS mitigation measures, there is no potential for adverse effects on the integrity of the site. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Direct impacts on habitats Introduction of INNS See **Section 3.1.2**	INNS mitigation measures will be implemented	Following the implementation of INNS mitigation measures, there is no potential for adverse effects on the integrity of the site. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation composition: plant health of foredune grasses. More than 95% of sand couch (*Elytrigia juncea*) and / or lyme-grass (*Leymus arenarius*) should be healthy (i.e. green plant parts above ground and flowering heads present)	Direct impacts on habitats Introduction of INNS See **Section 3.1.2**	INNS mitigation measures will be implemented	Following the implementation of INNS mitigation measures, there is no potential for adverse effects on the integrity of the site. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities with typical	Direct impacts on habitats Introduction of INNS	INNS mitigation measures will be implemented	Following the implementation of INNS mitigation measures, there is no potential for adverse effects on the integrity of the site. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
species: sand couch (*Elytrigia juncea*) and / or lyme-grass (*Leymus arenarius*)	See **Section 3.1.2**			site integrity predicted from the project in-combination with other plans and projects
Vegetation composition: negative indicator species. Negative indicator species (including non-native species) to represent less than 5% cover	Direct impacts on habitats Introduction of INNS See **Section 3.1.2**	INNS mitigation measures will be implemented	Following the implementation of INNS mitigation measures, there is no potential for adverse effects on the integrity of the site. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.1.1 Mudflats and sandflats not covered by seawater at low tide [1140], *Salicornia* and other annuals colonising mud and sand [1310]

Direct impacts on habitats

12. The Conservation Objective attributes and targets which are considered relevant to this impact are:

- Mudflats and sandflats not covered by seawater at low tide Habitat area.
    - Habitat Area. The permanent habitat area is stable or increasing, subject to natural processes.
    - Community extent. Maintain the extent of the *Zostera*-dominated community, subject to natural processes.
    - Community structure: *Zostera* density. Conserve the high quality of the Zostera-dominated community, subject to natural processes.
    - Community distribution. Conserve the following community type in a natural condition: Fine sands with Angulus tenuis community complex.
- *Salicornia* and other annuals colonising mud and sand
    - n/a – no direct overlap with this feature and therefore the CWP Project cannot contribute to in-combination effects through this impact.

13. The project alone assessment concluded that considering the small area of mudflat and sandflat affected, the relatively high resilience to physical disturbance of the habitat, the high recovery potential to changes in faunal abundances, and the avoidance of any work in sensitive habitats (i.e. *Zostera* sp.), it is concluded that there will be no adverse effects on the site integrity of the South Dublin Bay SAC from direct effects on habitats. As the planned works will all be undertaken within the Offshore Export Cable Corridor (OECC), there is no potential for interaction with the habitat *Salicornia* and other annuals colonising mud and sand which is located near to Booterstown Station to the south west of the OECC, as such no in-combination effects from direct impacts on habitats can arise.

14. Of the above described plans and projects that may act in-combination, the only other projects that has the potential for direct impacts on habitats are the site investigation (SI) licences for Codling Wind Park and Banba Wind Ltd. No other plans or projects directly overlap this SAC and thus can not contribute to direct impacts in-combination. As described for the Project Alone assessment, the benthic habitats within south Dublin Bay are subject to natural habitat disturbance and are characterised by opportunistic polychaetes and mobile amphipods that are indicative of, and adapted to, biotopes subject to natural and / or anthropogenic disturbance and recover quickly, < 1 year (Ashley, M., 2016).

15. It is anticipated that the SI works will only impact relatively small areas of habitat, and as such the degree of disturbance and recoverability are considered equivalent or less than that described for the CWP Project alone. Although there will likely be an increase in area of habitat affected in-combination, considering the small area affected by each project, the relatively high resilience to physical disturbance of the habitats, the high recovery potential to changes in faunal abundances, and the avoidance of any work in sensitive habitats (i.e. *Zostera* sp. area) by the CWP Project, it can be concluded there will be no long-term loss of the habitat area, no alteration in the long-term condition of the fine sands with *Angulus tenuis* community complex, and as the CWP project is located outside of the *Zostera* dominated community there will be no reduction in extent or quality of the attribute or associated target.

16. For the CWP project in-combination with tier one and tier 2a projects, it can therefore be concluded beyond reasonable scientific doubt that there will be no adverse effects on the site integrity of the South Dublin Bay SAC from direct impacts on habitats in combination with other plans or projects.

17. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on the site integrity of the South Dublin Bay SAC from direct impacts on habitats in combination with other plans or projects.

Increased SSC and sediment deposition

18. The Conservation Objective attributes and targets which are considered relevant to this impact are:

- Mudflats and sandflats not covered by seawater at low tide Habitat area.
    - Habitat area. The permanent habitat area is stable or increasing, subject to natural processes.
    - Community extent. Maintain the extent of the *Zostera*-dominated community, subject to natural processes.
    - Community structure: *Zostera* density. Conserve the high quality of the Zostera-dominated community, subject to natural processes.
    - Community distribution. Conserve the following community type in a natural condition: Fine sands with Angulus tenuis community complex.
- *Salicornia* and other annuals colonising mud and sand.
    - Habitat area. Area stable or increasing, subject to natural processes, including erosion and succession.
    - Habitat distribution. No decline, or change in habitat distribution, subject to natural processes.
    - Physical structure: sediment supply. Maintain, or where necessary restore, natural circulation of sediments and organic matter, without any physical obstructions.
    - Physical structure: creeks and pans. Maintain creek and pan structure, subject to natural processes, including erosion and succession.
    - Physical structure: flooding regime. Maintain natural tidal regime.
    - Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.
    - Vegetation structure: vegetation height. Maintain structural variation within sward.
    - Vegetation structure: vegetation cover. Maintain more than 90% of area outside creeks vegetated.
    - Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009).
    - Vegetation structure: negative indicator species – *Spartina anglica*. No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%.

19. The project alone assessment concluded that due to the high tolerance to this impact, and low levels of SSC and associated deposition predicted to arise from the works which will be well within natural background levels, there will be no adverse effects on the site integrity of the South Dublin Bay SAC from increased SSC and associated deposition on mudflat and sandflat habitats. For *Salicornia* and other annuals colonising mud and sand, given the low levels of increased SSC that may occur over a short duration as a result of CWP Project activities, high natural tolerance to this impact, and distance from the works to the habitat, no adverse effects on site integrity were concluded.

20. Of the relevant projects, the following are considered to have similar scale impacts to the CWP Project as they are similar project types, or include dredge and disposal programmes.

- Arklow Bank Phase 2;
- Dublin Array;
- North Irish Sea Array;
- Dublin Port Capital Dredging Project;
- Dublin Port Company MP2 Project;

- Maintenance dredging River Boyne; and
- Kish Offshore Wind Limited & Bray Offshore Wind Limited, Port and harbour activities (including capital and maintenance dredging) and port development.

21. The other projects will impact a much smaller area due to the nature of the projects as they do not involve dredge disposal. While activities associated with these projects will have the likelihood of increasing SSC, the combination of smaller areas and highly dynamic marine environments ensures any contribution to the in-combination levels of SSC will be negligible; in particular given the distances between the projects and CWP, and the temporal range of other plans and projects during which any interaction is considered to have a very low likelihood.

22. Sediment resuspension from projects working in the intertidal area will be minimal as the works required are small scale, localised, will in the main be undertaken during 'dry' conditions, and the nature of the activities (e.g. localised physical disturbance for cable installation or SI works) do not give rise to high levels of SSC. Furthermore, considering the predominant tidal directions, increases in SSC created during offshore works (e.g. dredging, dredge disposal, or subtidal cable installation), are not predicted to interact with the intertidal area in any meaningful volume. The levels of SSC that may impact the intertidal areas of the South Dublin Bay SAC from all relevant projects are therefore predicted to be less than or similar to the natural background levels experienced on a daily or annual basis by the habitats present.

23. Therefore, it is concluded that due to the high tolerance to this impact of the receiving habitats (Mudflats and sandflats not covered by seawater at low tide, and Salicornia and other annuals colonising mud and sand) to increased SSC existing as it does in an area of net accretion, low levels of SSC and associated deposition predicted to arise from any or all in-combination projects which will likely be well within natural background levels, there will be no adverse effects on any Conservation Objectives (i.e. no long-term loss or change in the *Salicornia* habitat area or distribution, or alteration of the physical or vegetation structure of the *Salicornia* Qualifying Interest (QI), or change the habitat area of the mudflat QI, alter the long-term condition on of the fine sands with *Angulus tenuis* community complex, or lead to any reduction in extent or quality of the *Zostera* community).

24. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on the site integrity of the South Dublin Bay SAC with other plans or projects.

25. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on the site integrity of the South Dublin Bay SAC with other plans or projects.

Remobilisation of contaminated sediments

26. The Conservation Objective attributes and targets which are considered relevant to this impact are:

- Mudflats and sandflats not covered by seawater at low tide Habitat area.
    - Habitat area. The permanent habitat area is stable or increasing, subject to natural processes.
    - Community extent. Maintain the extent of the *Zostera*-dominated community, subject to natural processes.
    - Community structure: *Zostera* density. Conserve the high quality of the Zostera-dominated community, subject to natural processes.
    - Community distribution. Conserve the following community type in a natural condition: Fine sands with Angulus tenuis community complex.
- *Salicornia* and other annuals colonising mud and sand.

- Habitat area. Area stable or increasing, subject to natural processes, including erosion and succession.
- Habitat distribution. No decline, or change in habitat distribution, subject to natural processes.
- Physical structure: sediment supply. Maintain, or where necessary restore, natural circulation of sediments and organic matter, without any physical obstructions.
- Physical structure: creeks and pans. Maintain creek and pan structure, subject to natural processes, including erosion and succession.
- Physical structure: flooding regime. Maintain natural tidal regime.
- Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.
- Vegetation structure: vegetation height. Maintain structural variation within sward.
- Vegetation structure: vegetation cover. Maintain more than 90% of area outside creeks vegetated.
- Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009).
- Vegetation structure: negative indicator species – *Spartina anglica*. No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%.

27. The project alone assessment concluded that considering the low levels of contamination within the sediments within the offshore development area, the relatively low predicted levels of sediment deposition, and predicted tolerance of individuals, this impact is not predicted to have any observable effect on the QIs. Given this, no adverse effects on the site integrity of the South Dublin Bay SAC from the remobilisation of contaminated sediments was predicted.

28. Relevant projects for the in-combination assessment are considered to be as per to those described for increases in SSC and associated deposition for the same reasons given above.

29. In the baseline site specific survey, contaminated sediment results showed low levels of chemical contaminants at stations sampled within the offshore development area. The majority of contaminants levels at sampled stations were below the Irish Lower Acceptable Level (AL) and Cefas AL1 (**Appendix 8.3 Benthic Baseline Report** of the EIAR). Typically contaminated sediments are only associated with finer sediments as they do not bind effectively with coarse sands and gravels. Published marine sediment contaminant data in the area also indicates a general low background level of contamination, with no patterns of consistently high levels of contaminants recorded spatially or temporally (data.gov.ie, 2007).

30. Considering the low levels of contamination within the sediments within the offshore development area, the relatively low predicted levels of sediment deposition predicted from any or all in-combination projects, and predicted tolerance of individuals to the in situ levels present, this impact in-combination is not predicted to have any observable effect on the QIs. Given this, it can be concluded beyond reasonable scientific doubt that no adverse effects on the Conservation Objectives for the feature will arise (i.e. no long term loss or change in the *Salicornia* habitat area or distribution, or alteration the physical or vegetation structure of the *Salicornia* QI, or change the habitat area of the mudflat QI, alter the long-term condition on of the fine sands with *Angulus tenuis* community complex, or lead to any reduction in extent or quality of the *zostera* community) .

31. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on the site integrity of the South Dublin Bay SAC in combination with other plans or projects.

32. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on the site integrity of the South Dublin Bay SAC in combination with other plans or projects.

Presence of EMF / temperature changes (O&M)

33. The Conservation Objective attributes and targets which are considered relevant to this impact are:

- Mudflats and sandflats not covered by seawater at low tide Habitat area.
    - Habitat area. The permanent habitat area is stable or increasing, subject to natural processes.
    - Community extent. Maintain the extent of the *Zostera*-dominated community, subject to natural processes.
    - Community structure: *Zostera* density. Conserve the high quality of the Zostera-dominated community, subject to natural processes.
    - Community distribution. Conserve the following community type in a natural condition: Fine sands with Angulus tenuis community complex.
- *Salicornia* and other annuals colonising mud and sand.
    - n/a – no overlap with this feature and Zone of EMF arising from cables and therefore the CWP Project cannot contribute to in-combination effects through this impact.

34. As the planned works will all be undertaken within the OECC, there is no potential for interaction with the habitat Salicornia and other annuals colonising mud and sand which is located near to Booterstown Station to the south west of the OECC, as such no in-combination effects from EMF can arise on this QI.

35. The project alone assessment for mudflats and sandflats not covered by seawater at low tide concluded that considering the low levels of EMF and predicted temperature changes associated with the installation of the OECC, and predicted tolerance and acclimatation of individuals, this impact is only considered to have the potential to cause very slight or imperceptible changes to key features of the baseline habitats. Given this, no adverse effects on the Conservation Objectives for the feature will arise and therefore there will be no adverse effects on the site integrity of the South Dublin Bay SAC from EMF and associated temperature changes.

36. Of the above described plans and projects that may act in-combination, there are none with the potential to emit EMF (i.e. electrical cables) which directly overlap the SAC. As such, there can be no in-combination impact. It should also be noted that all other planned or potential projects are sufficiently distant that there will be no interaction of EMF fields with other cables anywhere within the SAC.

37. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on the site integrity of the South Dublin Bay SAC in combination with other plans or projects.

38. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on the site integrity of the South Dublin Bay SAC in combination with other plans or projects.

Introduction of Invasive non-native species (INNS)

39. The Conservation Objective attributes and targets which are considered relevant to this impact are:

- Mudflats and sandflats not covered by seawater at low tide Habitat area.
    - Habitat area. The permanent habitat area is stable or increasing, subject to natural processes.
    - Community extent. Maintain the extent of the *Zostera*-dominated community, subject to natural processes.

- Community structure: *Zostera* density. Conserve the high quality of the Zostera-dominated community, subject to natural processes.
- Community distribution. Conserve the following community type in a natural condition: Fine sands with Angulus tenuis community complex.

- *Salicornia* and other annuals colonising mud and sand.
  - Habitat area. Area stable or increasing, subject to natural processes, including erosion and succession.
  - Habitat distribution. No decline, or change in habitat distribution, subject to natural processes.
  - Physical structure: sediment supply. Maintain, or where necessary restore, natural circulation of sediments and organic matter, without any physical obstructions.
  - Physical structure: creeks and pans. Maintain creek and pan structure, subject to natural processes, including erosion and succession.
  - Physical structure: flooding regime. Maintain natural tidal regime.
  - Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.
  - Vegetation structure: vegetation height. Maintain structural variation within sward.
  - Vegetation structure: vegetation cover. Maintain more than 90% of area outside creeks vegetated.
  - Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009).
  - Vegetation structure: negative indicator species – *Spartina anglica*. No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%.

40. The project alone assessment concluded that with the implementation of suitable mitigation, that no adverse effects on the Conservation Objectives for the features will arise and therefore there will be no adverse effects on the site integrity of the South Dublin Bay SAC from the introduction of INNS.

Mitigation

41. All activities on the CWP Project will operate under an agreed CEMP including biosecurity management measures which will detail the measures to minimise the potential to introduce INNS into the environment. It is expected that all projects will apply similar controls. With this (or similar / equivalent) mitigation in place for all projects, the potential for introduction of any INNS will not result in AESI.

Residual effect

42. Following the implementation of mitigation, it is concluded that the construction, operation and decommissioning of all in-combination plans and projects will not result in no long term loss or change in the *Salicornia* habitat area or distribution, or alteration the physical or vegetation structure of the *Salicornia* QI, change the habitat area of the mudflat QI, alter the long-term condition on of the fine sands with *Angulus tenuis* community complex, or lead to any reduction in extent or quality of the *zostera* community.

43. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on the site integrity of the South Dublin Bay SAC in combination with other plans or projects.

44. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on the site integrity of the South Dublin Bay SAC in combination with other plans or projects.

3.1.2 Annual vegetation of drift lines [1210], Embryonic shifting dunes [2110]

Direct impacts on habitats, increased SSC and associated deposition, remobilisation of contaminated sediments, and presence of EMF and associated temperature changes

There is no pathway for effect on these QIs from the above impacts project alone. As such, there can be no in-combination effect on the attributes and targets for this feature, and an adverse effect on site integrity can be excluded.

Introduction of terrestrial Invasive non-native species (INNS)

45. The Conservation Objectives attributes and targets which are considered relevant to this impact are:

- Annual vegetation of drift lines.
    - Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural process including erosion and succession.
    - Vegetation composition: typical species and subcommunities. Maintain the presence of species-poor communities with typical species: sea rocket *(Cakile maritima*), sea sandwort (*Honckenya peploides*), prickly saltwort (*Salsola kali*) and oraches (*Atriplex spp*.).
    - Vegetation composition: negative indicator species. Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat.

46. The Conservation Objectives attributes and targets which are considered relevant to this impact are:

- Embryonic shifting dunes
    - Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural process including erosion and succession.
    - Vegetation composition: plant health of foredune grasses. More than 95% of sand.
    - couch (*Elytrigia juncea*) and / or lyme-grass (*Leymus arenarius*) should be healthy (i.e. green plant parts above ground and flowering heads present).
    - Vegetation composition: typical species and subcommunities. Maintain the presence of species-poor communities with typical species: sand couch (*Elytrigia juncea)* and / or lyme-grass (*Leymus arenarius*).
    - Vegetation composition: negative indicator species. Negative indicator species (including non-native species) to represent less than 5% cover.

Mitigation

47. An Invasive Species Management Plan (ISMP) has been prepared and is included in **Appendix 1** of this report. The ISMP outlines control measures which will be put in place in order to control and treat the terrestrial INNS within the onshore development area. All treatment measure will be implemented by the appointed Contractor prior to the construction phase commencing. The treatment measures will result in the complete removal of terrestrial INNS within the Zone of Influence (ZoI) of the construction phase works.

Residual effect

48. The project alone assessment concluded that following the implementation of the treatment measures outlined within the ISMP, there is no potential for adverse effects on the integrity of South Dublin SAC,

in view of the Conservation Objectives for both QI habitats. Considering the complete removal of the INNS there is no potential for residual impacts that could adversely affect the integrity of the site. Thus, there is no potential for in-combination effects associated with the spread of terrestrial INNS into the SAC with other plans or projects.

3.2 Rockabill to Dalkey Island SAC

49. The following other plans and projects are considered as part of the in-combination assessment for Rockabill to Dalkey SAC (**Table 3-3**).

Table 3-3 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Arklow Bank OWF Phase 2 (CEA-0004)	9.8	9.9	2b
Arklow Bank Wind Park off coast of County Wicklow – Site Investigation(s) (CEA-2752; CEA-2753)	9	17	1
Banba Wind Ltd., Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Braymore Point – Site Investigations (CEA-2742)	53	27	1
Codling Wind Park Ltd. Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2748)	0	0	1
Dublin Array OWF (CEA-0037)	2.8	2	2a
Dublin Port Capital Dredging Project(s) (CEA-0206 – CEA-0210)	31.5	0.5	1
Dublin Port Company Site Investigations (CEA-2727)	29	0.2	1
Hibernian Wind Power – Kilmichael Point – Site Investigations (CEA-2756)	25	34.5	1
Lir Offshore Array Ltd., Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA2745)	48	37	1
Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
MaresConnect Electricity Interconnector Site Investigation(s) (CEA-2749)	30	9.5	1
(Dublin Port Company) MP2 Project (CEA- CEA-1323)	31.6	0	1
MP2 Project: Jetty development (CEA-1328on / off)	32.1	4	1
North Irish Sea Array (NISA) Site Investigations (CEA-2738)	40	22.5	1
North Irish Sea Array OWF (CEA-0094Off)	40.8	23	2a

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Rockabill Cable Systems Ltd – site investigations (CEA-2732)	42	17	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Sure Partners Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sure Partners Site Investigations at Arklow Bank (CEA-2736)	9	17	1
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Irish Mussel Seed Company – Aquaculture	35	43.7	1
Dublin City Council, Environmental survey and ground investigation (CEA-2996)	1.5	34	1
Kish Offshore Wind Limited & Bray Offshore Wind Limited, Port and harbour activities (including capital and maintenance dredging) and port development. (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd, geophysical and site investigation surveys, Portmarnock (CEA-2991)	34	8	1
Microsoft Ireland Operations Ltd, geophysical and site investigation surveys, Dublin Port (CEA-2989)	30	0	1
Iarnród Éireann, Geotechnical and Geophysical site investigation survey (CEA-2993)	2	28	1

50. It is not considered that there is any other plan or project that could act on this European site in-combination with the CWP project at a level which could impact the attributes and targets of the Conservation Objectives such that it may lead to an in-combination adverse effect on site integrity (**Table 3-4**).

Table 3-4 Conservation objectives for the Rockabill To Dalkey SAC and summary of associated assessment of the CWP Project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
Reefs [1170] *Conservation Objective: To maintain the favourable conservation condition of Reefs in Rockabill to Dalkey Island SAC, which is defined by the following list of attributes and targets:*				
Habitat area. The permanent area is stable or increasing, subject to natural processes.	Direct impacts on habitats Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS Presence of EMF / temperature changes (O&M) See **Section 3.2.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Habitat distribution. Distribution is stable or increasing, subject to natural processes.	Direct impacts on habitats Increased SSC and Sediment Deposition	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
	Remobilisation of contaminated sediments Introduction of INNS Presence of EMF / temperature changes (O&M) See **Section 3.2.1**		will not result in AESI. No mitigation required for other Impacts	combination with other plans and projects
Community structure. Conserve the following community types in a natural condition: Intertidal reef community complex; and Subtidal reef community complex	Direct impacts on habitats Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS Presence of EMF / temperature changes (O&M) See **Section 3.2.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.2.1 Reefs [1150]

Direct impacts on habitats, increased SSC and associated deposition, remobilisation of contaminated sediments, and presence of EMF and associated temperature changes

51. The Conservation Objective attributes and targets which are considered relevant to this impact are:

- Habitat area. The permanent area is stable or increasing, subject to natural processes.
- Habitat distribution. Distribution is stable or increasing, subject to natural processes.
- Community structure. Conserve the following community types in a natural condition: Intertidal reef community complex; and Subtidal reef community complex.

52. No reef habitat will be directly affected by the CWP Project as it is all situated outside of the OECC. The reef habitat within Rockabill to Dalkey Island SAC is located to the north or west of the CWP offshore development area. Based upon the modelling of sediment transport arising from the CWP Project activities, there is negligible potential for increases in SSC to affect the protected habitats within the Rockabill to Dalkey SAC. Sediment transport is predicted to travel in an easterly or southerly direction. As such, no in combination adverse effects on site integrity will arise on the Rockabill to Dalkey Island SAC, as any sediment arisings resulting from the CWP Project that may reach the SAC being so immaterial that they could not in any way contribute to an in-combination adverse effect and with the CWP project likely to make only a *de minimis* contribution to any in-combination impact on the Reefs QI.

53. Therefore, given this *de-minimis* contribution, the CWP Project will not contribute to any in-combination adverse effect on habitat area, distribution, or community structure.

54. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

55. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Introduction of Invasive non-native species (INNS)

56. The Conservation Objective attributes and targets which are considered relevant to this impact are:

- Habitat area. The permanent area is stable or increasing, subject to natural processes.
- Habitat distribution. Distribution is stable or increasing, subject to natural processes.
- Community structure. Conserve the following community types in a natural condition: Intertidal reef community complex; and Subtidal reef community complex.

57. The project alone assessment concluded that with the implementation of suitable mitigation, that no adverse effects on the Conservation Objectives for the features will arise and therefore there will be no adverse effects on the site integrity of the Rockabill to Dalkey SAC from the introduction of INNS.

Mitigation

58. All activities on the CWP Project will operate under an agreed CEMP including biosecurity management measures which will detail the measures to minimise the potential to introduce INNS into the environment. It is expected that in accordance with European Regulations and best practice all projects will apply similar controls. With this (or similar / equivalent) mitigation in place for all projects,

the potential for introduction of any INNS will not result in AESI across all in-combination plans and projects, and thus there is no AESI overall.

Residual effect

59. Following the implementation of mitigation, it is concluded that the construction, operation and decommissioning of all in-combination plans and projects will not result in any change in habitat area, distribution or community structure.

60. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

61. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.2.2 Harbour porpoise

Table 3-5 Conservation objectives for the Rockabill to Dalkey SAC and summary of associated assessment of the CWP Project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
Range: Species range within the site should not be restricted by artificial barriers to site use. **Population:** Human activities should occur at levels that do not adversely affect the harbour porpoise population at the site.	Increased underwater noise:			Adverse effects on the qualifying Annex II feature (harbour porpoise) of the Rockabill to Dalkey Island SAC will not occur as a result of impacts associated with the CWP Project in-combination with other projects.
	The CWP Project has committed to implementing both a Unexploded Ordnance (UXO) Marine Mammal Management Plan (MMMP) and a piling MMMP. Increased underwater noise from the CWP Project in combination with other projects is not expected to result in the permanent exclusion of harbour porpoise from part of its range within the site and will not permanently prevent access for the species to suitable habitat.	No additional mitigation is required.	There is no potential for an AESI associated with maintaining the species (harbour porpoise) range due to increased underwater noise from the CWP Project in-combination with other projects.	
	Collision risk:			
	The CWP Project has committed to implementing an EVMP. Other projects are anticipated to comply with Marine Wildlife Watching Codes. Collision risk from the CWP	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of collision risk from the CWP Project in-combination with other projects.	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	Project in-combination with other projects is not expected to: - result in the permanent exclusion of harbour porpoise from part of its range within the site and permanently prevent access for the species to suitable habitat; and - adversely affect the harbour porpoise population at the site.			
	Changes in prey availability:			
	Changes in prey availability from the CWP Project in-combination with other projects will not cause barriers to site use and are not expected to adversely affect the harbour porpoise population at the site.	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the site from changes in prey availability from the CWP Project in-combination with other projects.	
	Changes in available habitat:			
	Changes in available habitat from CWP Project in-combination with other projects are not expected to: - result in the permanent exclusion of harbour porpoise from part of its	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the site from changes in available habitat from the CWP Project in-combination with other projects.	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	range within the site and permanently prevent access for the species to suitable habitat; and - adversely affect the harbour porpoise population at the site.			

Increased underwater noise

62. Target 2 of the Conservation Objectives states that *"proposed activities or operations should not introduce man-made energy (e.g. aerial or underwater noise, light or thermal energy) at levels that could result in a significant negative impact on individuals and / or the population of harbour porpoise within the site"*.

63. The Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with the Rockabill to Dalkey Island SAC from increased underwater noise, either ex situ or in situ.

Assessment of the Project In-Combination

64. This assessment focuses on the potential in-combination impact of construction activities at other offshore projects in the Celtic and Irish Sea Management Units (MU) for porpoise in 2027 (the same year as piling at the CWP project). As outlined in **EIAR Chapter 11, Appendix 11.1 Cumulative effects assessment for marine mammals**, there are expected to be seven other OWFs in the Celtic and Irish Sea MU that will be constructing in 2027 as well as two tidal projects, three coastal projects and one cable project (**Table 3-6**). As such, these offshore projects have been screened into the in-combination assessment for disturbance from underwater noise for harbour porpoise.

Table 3-6 Offshore projects constructing in the Celtic and Irish Sea MU in 2027

Project	Tier	Type
Codling	-	OWF
Awel y Môr	1	OWF
Erebus Floating Wind Demo	1	Floating
White Cross	1	Floating
West Somerset Tidal Lagoon	1	Tidal
Arklow Waste Water Treatment	1	Coastal
Maintenance dredging River Boyne, Drogheda	1	Coastal
North Wall Emergency Power Generation Plant	1	Coastal
Oriel	2b	OWF
Sceirde Rocks	2a	OWF
Morecambe	2b	OWF
Isle of Man	2b	OWF
Mares Connect	3	Cable
Holyhead Deep	3	Tidal

65. Of these, four OWF projects have at least a draft Report to Inform Appropriate Assessment available (Morecambe, Awel y Mor, Erebus and Sceirde Rocks). Three of the OWFs conclude no AESI to the Conservation Objectives of the harbour porpoise feature of the Rockabill to Dalkey Island SAC as a

result of disturbance from piling, whilst two projects (Erebus and White Cross) did not screen in the Rockabill to Dalkey Island SAC.

66. To quantitatively assess the potential for disturbance to the SAC for each of the projects in-combination, a 26 km (fixed) or 15 km (floating (i.e., anchor pile installation) and / or jacket (pin) pile installation) Effective Deterrent Range (EDR) was assumed as an indicative disturbance area for each OWF project (this follows the guidance in Joint Nature Conservation Committee ((JNCC (2020)) for disturbance assessments to porpoise SACs in England, Wales and Northern Ireland where 26 km EDR is advised for monopiles and 15 km EDR is advised for pin-piles). Additionally, it was assumed that coastal, tidal and cable projects require no piling activities and thus disturbance effects during construction are expected to be limited to activities such as dredging, trenching, cable laying, vessel activity etc for which a maximum 5 km EDR has been assumed (as per (McQueen et al., 2020) for dredging activities).

67. With regards in situ effects the CWP project was the only project to have disturbance contours that overlapped with the boundary of the Rockabill to Dalkey Island SAC (see **Table 3-7** and **Figure 3-1**). With regards ex situ effects, the level of disturbance predicted to occur within the Celtic and Irish Sea MU between 2023 and 2028, and in particular in 2027, 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. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the SAC from an increase in underwater noise from construction activities from CWP Project in-combination with other projects, either ex situ or in situ.

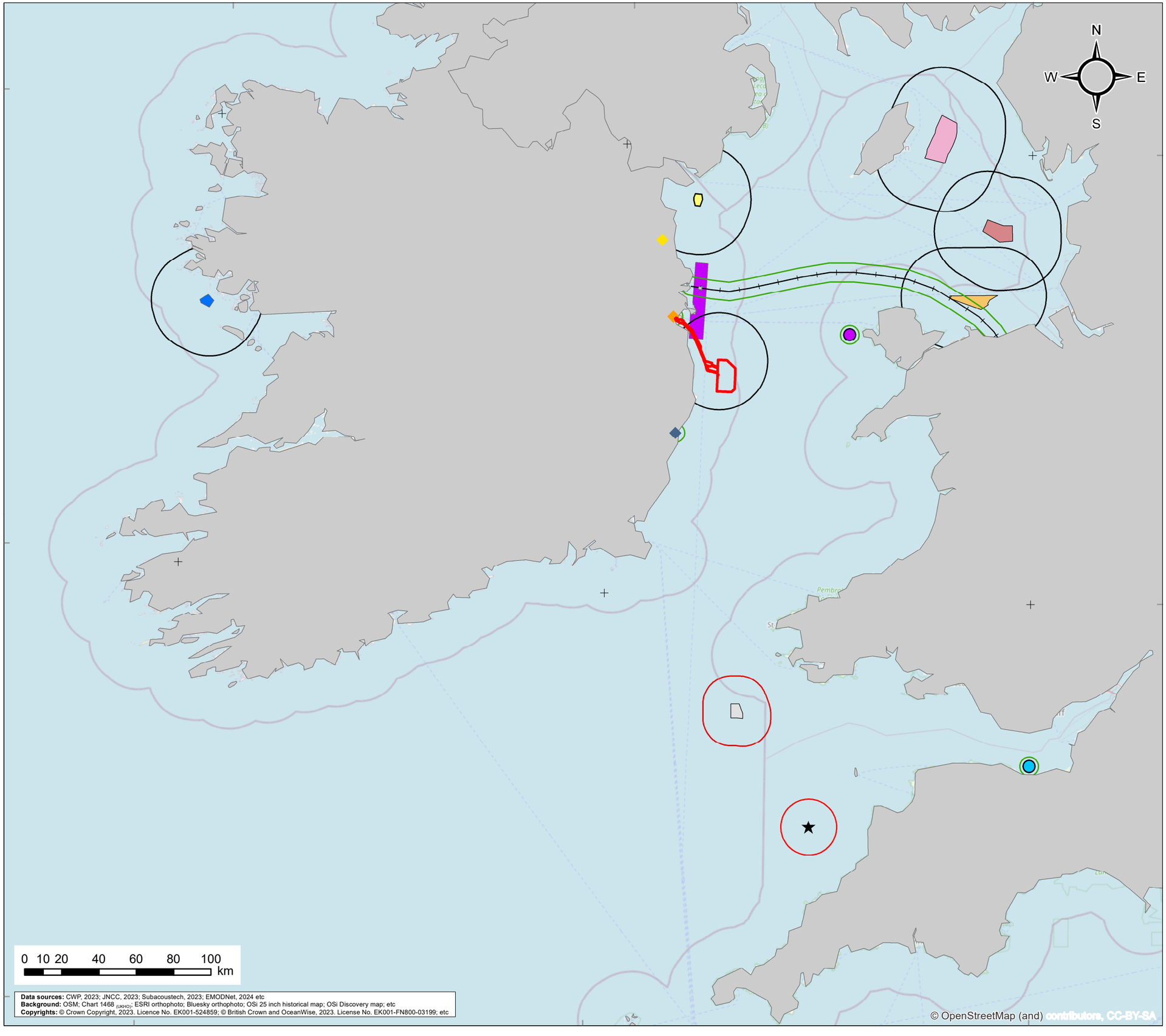
Table 3-7 Predicted overlap of disturbance contours from each OWF project constructing in 2027 and the boundary of the Rockabill to Dalkey Island SAC

Project	Type	Disturbance threshold	SAC overlap (km^2)	Conclusions of the RIAA (where available)
Codling	OWF	Dose-response effective area	74.6	No potential for an Impediment to the Conservation Objectives of the harbour porpoise feature of the Rockabill to Dalkey Island SAC.
		145 dB SEL_{ss}	59.4	
		26 km EDR	81.9	
Awel y Môr	OWF	26 km EDR	0	*"no potential for an AEoI to the Conservation Objectives of the harbour porpoise feature of all sites screened in for disturbance (underwater noise) from AyM alone"*[4]
Morecambe	OWF	26 km EDR	0	*"no significant disturbance effect on the harbour porpoise CIS MU population or the Rockabill to Dalkey Island SAC population from underwater noise during piling"*[5]
Erebus (floating)	OWF	15 km EDR	0	Did not screen in this SAC for assessment[6]

[4] Awel y Môr Offshore Wind Farm. Report 5.2: Report to Inform Appropriate Assessment. April 2022.
[5] Morcambe Offshore Windfarm. Draft Report to Inform the Appropriate Assessment. March 2023.
[6] Erebus Floating Offshore Wind Farm. Non-Technical Summary. December 2021.

White Cross	OWF	15 km EDR	0	Did not screen in this SAC for assessment[7]
Sceirde Rocks	OWF	26 km EDR	0	At present, only an NIS has been made available for site investigation works within the Sceirde Rocks MAC area. The conclusions are as follows: "*The proposed site investigation activities at Sceirde Rocks Offshore Wind Farm, individually or in combination with another plan or project, will not have an adverse effect on the integrity of Rockabill to Dalkey Island SAC*"[8]. An NIS for the OWF itself is not yet published.
Oriel	OWF	26 km EDR	0	Not yet published
Isle of Man	OWF	26 km EDR	0	Not yet published
West Somerset Tidal Lagoon	Tidal	5 km EDR	0	Not available within the public domain
Arklow Waste Water Treatment	Coastal	5 km EDR	0	Not available within the public domain
Maintenance dredging River Boyne, Drogheda	Coastal	5 km EDR	0	Not available within the public domain
North Wall Emergency Power Generation Plant	Coastal	5 km EDR	0	Not available within the public domain
Mares Connect	Cable	5 km EDR	0	Not yet published
Holyhead Deep	Tidal	5 km EDR	0	Not available within the public domain

[7] White Cross Offshore Windfarm Environmental Statement Chapter 12: Marine Mammal and Marine Turtle Ecology. March 2023. This focuses on impacts to the Bristol Channel Approaches SAC only for porpoise.
[8] https://www.gov.ie/pdf/?file=https://assets.gov.ie/255365/81f9f420-91c3-47ce-b501-59f268897b8d.pdf#page=null



Legend

- Planning application boundary
- 5 km EDR
- 15 km EDR
- 26 km EDR
- North Wall Power Plant
- Arklow Waste Treatment Plant
- Dogheda Maintenance Dredge
- West Somerset Lagoon Tidal
- Holyhead Deep Tidal
- Mares Connect
- Whitecross
- Sceirde Rocks
- Oriel
- Awel y Mor
- Isle of Man
- Morcambe
- Erebus (Floating)
- Rockabill to Dalkey Island SAC

codling wind park

Project: Codling Wind Park

SMRU Consulting
understand • assess • mitigate

Figure 3.1:
26 km EDR for piling in combination with the 5 km, 15 km and 26 km EDR from other construction projects, in relation to the Rockabill to Dalkey Island SAC designated for harbour porpoise

CWP doc. number: CWP-SMR-ENG-08-01-MAP-1682

Internal descriptive code:
IRE - PAB..DPNM.THRESH.5EDR.15EDR.26EDR.CONT. - ARK.WASTE.TP..AWEL..DOGHEDA.MAIN.DIREDGE..EREBUS..HOLY.DEEPTIDAL..ISLE OF MAN..MARES.CONNECT..MORCAMBE..NORTH.WALL.PP..ORIEL..SCEIRDE.ROCKS..WEST.SOMER.LAG.TIDAL..WHITECROSS..ROCKABILL to DALKEY.ISL.SAC - (NIS.Vol.06.a.Sec.03.FIG.15)

Size: A3
Scale: 1:2,000,000

CRS: EPSG 25830

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
A	Final version	2024/07/17	JC	RRS/EA	JM

Vessel collision

68. Target 2 of the Conservation Objectives states that *"proposed activities or operations should not cause death or injury to individuals to an extent that may ultimately affect the harbour porpoise population at the site"*.

69. The Project alone assessment concluded that, giving consideration to primary mitigation measures, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from collision risk, either ex situ or in situ.

Assessment of the Project In-Combination

70. The risk of collision to marine mammals is expected to be primarily localised to within the boundaries of the respective projects. The OECC of the CWP Project overlaps with the Rockabill to Dalkey Island SAC, as does the OECC for Dublin Array. Therefore, vessel activity associated with these two projects will occur within the Rockabill to Dalkey Island SAC. The OECC for NISA does not overlap with the SAC. The vessel routes and potential ports used by other offshore projects are unknown, and therefore it is not possible to estimate the expected level of vessel activity within the Rockabill to Dalkey Island SAC from other projects. However, it is assumed that all other offshore projects in the Celtic and Irish Sea MU will either adopt a Vessel Management Plan (VMP) or follow best practice codes of conduct on vessel handing around marine mammals[9] to minimise any potential effects on marine mammals and reduce risk of collision. As such, the potential for collision risk from CWP Project in-combination with other projects is considered negligible.

71. No harbour porpoise within the SAC are expected to experience death or injury from vessel collisions and as such, risk of collision will not adversely affect the harbour porpoise community at the site. Therefore, there is expected to be no potential for Impediment to the Conservation Objectives of the harbour porpoise community from collision risk from the CWP Project in-combination with other projects.

Changes in prey availability

72. Target 2 of the Conservation Objectives states that "*Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site. This target also relates to proposed activities or operations that may result in the deterioration of key resources (e.g. water quality, feeding, etc.) upon which harbour porpoise depend*".

73. The Project Alone assessment concluded that there is no potential for an Impediment to the Conservation Objectives of the harbour porpoise community associated with the Rockabill to Dalkey Island SAC from changes in prey availability.

Assessment of the Project In-Combination

74. Where multiple projects may impact upon harbour porpoise fish prey species or the habitats that support the prey within the site, there is the potential for in-combination indirect effects on the harbour porpoise community. Therefore, projects with the potential to act in-combination with CWP are those

[9] E.g. IWDG code of conduct (https://iwdg.ie/cms_files/wp-content/uploads/2022/06/Code-of-Conduct-When-Encountering-Whales-And-Dolphins-A3-Document.pdf), Sea Wise Code advised by NRW (https://naturalresources.wales/media/3513/sea-wise-code.pdf), South and West Wales seabird and seal code of conduct (https://www.welshwildlife.org/nature-reserves/code-conduct-seabirds-and-seals).

where the spatial footprint of activities (e.g., underwater noise, seabed disturbance) may encroach upon the SAC. This restricts relevant projects to the Dublin Array and NISA OWFs, which lie adjacent to the site. Given the comparable nature of these projects to CWP, it is likely that their potential for impacts to prey availability on the site is similar to that from CWP.

75. To inform this NIS, Chapter **9 Fish, Shellfish and Turtle Ecology** of the EIAR prepared for the Project was referred to. The EIAR concludes that there will be no significant impact to any fish species from any impact pathway during the construction, operation or decommissioning of the CWP Project alone (this includes: direct damage, disturbance, increased suspended sediment concentration (SSC) and sediment deposition, release of seabed contaminants, underwater noise etc). None of the modelled underwater noise impact ranges for injury to fish assessed in the EIAR overlapped with the Rockabill to Dalkey Island SAC, and thus for the purposes of this NIS, there is expected to be no direct impact to marine mammal prey species within the SAC boundary.

76. Considering the conclusions for the Project Alone assessment, the potential for CWP to provide a non-negligible contribution to in-combination effects on prey availability alongside other projects is considered to be remote. To inform this NIS assessment, the assessment of potential cumulative effects on fish and shellfish receptors carried out as a part of the EIAR (**Chapter 9 Fish, Shellfish and Turtle Ecology**) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to harbour porpoise prey species within the SAC, it does assess the broader potential for cumulative effects to these wide-ranging fish species to result from CWP in combination with relevant projects, including OWF projects on the east coast of Ireland, including Arklow Bank, Dublin Array and NISA. The EIAR concluded that impacts such as temporary habitat loss or disturbance, long-term habitat loss and increased suspended sediments concentrations are expected to occur over a spatial extent which is very small relative to the wider area over which developments occur, and relative to the size of available spawning and nursery areas for fish. Therefore, these impacts are considered negligible in the context of the wider availability of suitable habitat for marine mammal prey species. In summary, the cumulative assessment for fish and shellfish does not identify any significant cumulative effects resulting from the CWP Project alongside other projects. As such, it is anticipated that during the construction phase and any maintenance / decommissioning activities at CWP and other projects, any impacts to harbour porpoise prey availability will be negligible.

77. Considering the above, there is expected to be no long-term change to harbour porpoise prey species presence, abundance, condition or diversity; as such, there will be no deterioration of key resources (feeding) upon which harbour porpoises depend. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise community from changes in prey availability from the CWP Project in-combination with other projects, either ex situ or in situ.

Changes in available habitat

78. Target 1 of the Conservation Objectives states that *"Species range within the site should not be restricted by artificial barriers to site use. This target may be considered relevant to proposed activities or operations that will result in the permanent exclusion of harbour porpoise from part of its range within the site or will permanently prevent access for the species to suitable habitat therein"*.

79. The Project Alone assessment concluded that there is no potential for an Impediment to the Conservation Objectives of the harbour porpoise community associated with the Rockabill to Dalkey Island SAC from changes in available habitat.

80. While offshore projects within the Celtic and Irish Sea MU have the potential to cause disturbance impacts to harbour porpoise, like CWP Project alone, the behavioural effects will be short-lived, and animals are expected to return to baseline activities following the cessation of activities. As such, no activities at any project are expected to result in the permanent exclusion of harbour porpoise from part of their range within the Rockabill to Dalkey Island SAC.

81. The presence of vessels can also cause changes in available habitat through displacement of marine mammals due to disturbance. Vessel activity associated with CWP Project and other projects will be confined to the respective project areas and vessels will follow transit routes to and from ports, in areas characterised by relatively high levels of baseline traffic. It should be noted that only vessels associated with the CWP Project shall be present within the SAC during all phases of the project, as the OECC overlaps with the SAC boundary. No other projects and their construction boundaries within the Celtic and Irish Sea MU shall overlap with the Rockabill and Dalkey Island SAC. Additionally, there are limited projects anticipated to interact in-combination with CWP vessels, and other projects will be expected to follow similar mitigation requirements to avoid an adverse effect. While disturbance from vessels can result in short-term changes to porpoise behaviour, it is unlikely to result in long-term changes to available habitat or permanent exclusion of harbour porpoise from their range within the SAC. As such, the disturbance due to underwater noise will be below levels that may adversely affect harbour porpoise population at the site.

82. Considering the above, there is expected to be no potential for Impediment to the Conservation Objectives of the harbour porpoise community from changes in available habitat from the CWP Project in-combination with other projects, either ex situ or in situ.

3.3 North Dublin Bay SAC

83. The following other plans and projects are considered as part of the in-combination assessment for North Dublin Bay SAC (**Table 3-8**).

Table 3-8 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Arklow Bank OWF Phase 2 (CEA-0004)	9.8	9.9	2b
Arklow Bank Wind Park off coast of County Wicklow – Site Investigation(s) (CEA-2752; CEA-2753)	9	17	1
Banba Wind Ltd., Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Braymore Point – Site Investigations (CEA-2742)	53	27	1
Codling Wind Park Ltd. Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2748)	0	0	1
Dublin Array OWF (CEA-0037)	2.8	2	2a

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Dublin Port Capital Dredging Project(s) (CEA-0206 – CEA-0210)	31.5	0.5	1
Dublin Port Company Site Investigations (CEA-2727)	29	0.2	1
Hibernian Wind Power – Kilmichael Point – Site Investigations (CEA-2756)	25	34.5	1
Lir Offshore Array Ltd., Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA2745)	48	37	1
Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
MaresConnect Electricity Interconnector Site Investigation(s) (CEA-2749)	30	9.5	1
(Dublin Port Company) MP2 Project (CEA- CEA-1323)	31.6	0	1
MP2 Project: Jetty development (CEA-1328on / off)	32.1	4	1
North Irish Sea Array (NISA) Site Investigations (CEA-2738)	40	22.5	1
North Irish Sea Array OWF (CEA-0094Off)	40.8	23	2a
Rockabill Cable Systems Ltd – site investigations (CEA-2732)	42	17	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Sure Partners Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sure Partners Site Investigations at Arklow Bank (CEA-2736)	9	17	1
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Irish Mussel Seed Company – Aquaculture	35	43.7	1
Dublin City Council, Environmental survey and ground investigation (CEA-2996)	1.5	34	1
Kish Offshore Wind Limited & Bray Offshore Wind Limited, Port and harbour activities (including	23	1	3

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
capital and maintenance dredging) and port development. (CEA-2979)			
Microsoft Ireland Operations Ltd, geophysical and site investigation surveys, Portmarnock (CEA-2991)	34	8	1
Microsoft Ireland Operations Ltd, geophysical and site investigation surveys, Dublin Port (CEA-2989)	30	0	1
Iarnród Éireann, Geotechnical and Geophysical site investigation survey (CEA-2993)	2	28	1

84. It is not considered that there is any other plan or project that could act on this European site in-combination with the CWP project at a level which could impact the attributes and targets of the Conservation Objectives such that it may lead to an in-combination adverse effect on site integrity (**Table 3-9**).

Table 3-9 Conservation Objectives, Attributes and Targets for North Dublin Bay SAC and summary of associated assessment of the CWP Project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
Mudflats and sandflats not covered by seawater at low tide [1140] *Conservation Objective: To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in North Dublin Bay SAC, which is defined by the following list of attributes and targets:*				
Habitat area. The permanent habitat area is stable or increasing, subject to natural processes.	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Community extent. Maintain the extent of the *Mytilus edulis*-dominated community, subject to natural processes	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
Community structure: *Mytilus edulis* density. Conserve the high quality of the *Mytilus edulis*-dominated community, subject to natural processes	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Community distribution. Conserve the following community types in a natural condition: Fine sand to sandy mud with *Pygospio elegans* and *Crangon crangon* community complex; Fine sand with *Spio martinensis* community complex	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Salicornia and other annuals colonising mud and sand [1310] *Conservation Objective: To restore the favourable conservation condition of Salicornia and other annuals colonizing mud and sand in North Dublin Bay SAC, which is defined by the following list of attributes and targets:*				

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
Habitat area. Area stable or increasing, subject to natural processes, including erosion and succession.	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Habitat distribution. No decline, or change in habitat distribution, subject to natural processes	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Physical structure: sediment supply. Maintain, or where necessary restore, natural circulation of sediments and organic matter, without any physical obstructions	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
Physical structure: creeks and pans. Maintain creek and pan structure, subject to natural processes, including erosion and succession	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Physical structure: flooding regime. Maintain natural tidal regime	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation structure: vegetation height. Maintain	Increased SSC and Sediment Deposition	CEMP including biosecurity	Following the implementation of INNS mitigation measures, pathway for	No impediment to the Conservation Objective

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
structural variation within sward	Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	management measures to manage introduction of INNS	introduction of INNS will not result in AESI. No mitigation required for other Impacts	being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation structure: vegetation cover. Maintain more than 90% of area outside creeks vegetated	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009)	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation structure: negative indicator species – *Spartina anglica*. No significant expansion of	Increased SSC and Sediment Deposition	CEMP including biosecurity management measures	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in	No impediment to the Conservation Objective being met, and following mitigation

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	to manage introduction of INNS	AESI. No mitigation required for other Impacts	there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]				
Habitat area. Area stable or increasing, subject to natural processes, including erosion and succession. For sub-site mapped: North Bull Island – 81.84ha	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Habitat distribution. No decline or change in habitat	Increased SSC and Sediment Deposition	CEMP including biosecurity management measures	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in	No impediment to the Conservation Objective being met, and

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
distribution, subject to natural processes.	Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	to manage introduction of INNS	AESI. No mitigation required for other Impacts	following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Physical structure: sediment supply. Maintain natural circulation of sediments and organic matter, without any physical obstructions	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Physical structure: creeks and pans. Maintain creek and pan structure, subject to natural processes, including erosion and succession	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Physical structure: flooding regime. Maintain natural tidal regime	Increased SSC and Sediment Deposition	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
	Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**			adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation structure: zonation. Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation structure: vegetation height. Maintain structural variation within sward	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation structure: vegetation cover. Maintain more than 90% area outside creeks vegetated	Increased SSC and Sediment Deposition	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
	Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**			adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation composition: typical species and sub-communities. Maintain range of sub-communities with typical species listed in SMP (McCorry and Ryle, 2009)	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation structure: negative indicator species – *Spartina anglica*. No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Mediterranean salt meadows (*Juncetalia maritimi*) [1410]				
Conservation Objective: To maintain the favourable conservation condition of Mediterranean salt meadows (Juncetalia maritimi) in North Dublin Bay SAC, which is defined by the following list of attributes and targets:				

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
Habitat area. Area stable or increasing, subject to natural processes, including erosion and succession.	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Habitat distribution. No decline or change in habitat distribution, subject to natural processes.	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Physical structure: sediment supply. Maintain / restore natural circulation of sediments and organic matter, without any physical obstructions	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
Physical structure: creeks and pans. Maintain creek and pan structure, subject to natural processes, including erosion and succession	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Physical structure: flooding regime. Maintain natural tidal regime	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation structure: zonation. Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation structure: vegetation height. Maintain	Increased SSC and Sediment Deposition	CEMP including biosecurity	Following the implementation of INNS mitigation measures, pathway for	No impediment to the Conservation Objective

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
structural variation in the sward	Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	management measures to manage introduction of INNS	introduction of INNS will not result in AESI. No mitigation required for other Impacts	being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation structure: vegetation cover. Maintain more than 90% of area outside creeks vegetated	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation composition: typical species and sub-communities. Maintain range of sub-communities with characteristic species listed in SMP (McCorry and Ryle, 2009)	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation structure: negative indicator species – *Spartina anglica*. No significant expansion of	Increased SSC and Sediment Deposition	CEMP including biosecurity management measures	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in	No impediment to the Conservation Objective being met, and following mitigation

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	to manage introduction of INNS	AESI. No mitigation required for other Impacts	there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects
Vegetation composition: negative indicator species. Negative indicator species (including non-native species) to represent less than 5% cover	Increased SSC and Sediment Deposition Remobilisation of contaminated sediments Introduction of INNS See **Section 3.3.1**	CEMP including biosecurity management measures to manage introduction of INNS	Following the implementation of INNS mitigation measures, pathway for introduction of INNS will not result in AESI. No mitigation required for other Impacts	No impediment to the Conservation Objective being met, and following mitigation there will not be an adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.3.1 Mudflats and sandflats not covered by seawater at low tide [1140], Salicornia and other annuals colonising mud and sand [1310], and Mediterranean salt meadows (*Juncetalia maritimi*) [1410]

Increased SSC and associated deposition and remobilisation of contaminated sediments.

85. The Conservation Objective attributes and targets which are considered relevant to these impacts are:

- Mudflats and sandflats not covered by seawater at low tide [1140]
    - Habitat area. The permanent habitat area is stable or increasing, subject to natural processes.
    - Community extent. Maintain the extent of the *Mytilus edulis*-dominated community, subject to natural processes.
    - Community structure: *Mytilus edulis* density. Conserve the high quality of the *Mytilus edulis*-dominated community, subject to natural processes.
    - Community distribution. Conserve the following community types in a natural condition: Fine sand to sandy mud with *Pygospio elegans* and *Crangon crangon* community complex; Fine sand with *Spio martinensis* community complex.
- Salicornia and other annuals colonising mud and sand [1310]
    - Habitat area. Area stable or increasing, subject to natural processes, including erosion and succession.
    - Habitat distribution. No decline, or change in habitat distribution, subject to natural processes.
    - Physical structure: sediment supply. Maintain, or where necessary restore, natural circulation of sediments and organic matter, without any physical obstructions.
    - Physical structure: creeks and pans. Maintain creek and pan structure, subject to natural processes, including erosion and succession.
    - Physical structure: flooding regime. Maintain natural tidal regime.
    - Vegetation structure: zonation. Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.
    - Vegetation structure: vegetation height. Maintain structural variation within sward.
    - Vegetation structure: vegetation cover. Maintain more than 90% of area outside creeks vegetated.
    - Vegetation composition: typical species and sub-communities. Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009).
    - Vegetation structure: negative indicator species – *Spartina anglica*. No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%.
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]
    - Habitat area. Area stable or increasing, subject to natural processes, including erosion and succession. For sub-site mapped: North Bull Island – 81.84ha.
    - Habitat distribution. No decline or change in habitat distribution, subject to natural processes.
    - Physical structure: sediment supply. Maintain natural circulation of sediments and organic matter, without any physical obstructions.
    - Physical structure: creeks and pans. Maintain creek and pan structure, subject to natural processes, including erosion and succession.
    - Physical structure: flooding regime. Maintain natural tidal regime.
    - Vegetation structure: zonation. Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.
    - Vegetation structure: vegetation height. Maintain structural variation within sward.
    - Vegetation structure: vegetation cover. Maintain more than 90% area outside creeks vegetated.
    - Vegetation composition: typical species and sub-communities. maintain range of sub-communities with typical species listed in SMP (McCorry and Ryle, 2009)

    - Vegetation structure: negative indicator species – *Spartina anglica*. No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%
- Mediterranean salt meadows (*Juncetalia maritimi*) [1410]
    - Habitat area. Area stable or increasing, subject to natural processes, including erosion and succession.
    - Habitat distribution. No decline or change in habitat distribution, subject to natural processes.
    - Physical structure: sediment supply. Maintain / restore natural circulation of sediments and organic matter, without any physical obstructions
    - Physical structure: creeks and pans. Maintain creek and pan structure, subject to natural processes, including erosion and succession
    - Physical structure: flooding regime. Maintain natural tidal regime
    - Vegetation structure: zonation. Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession
    - Vegetation structure: vegetation height. Maintain structural variation in the sward
    - Vegetation structure: vegetation cover. Maintain more than 90% of area outside creeks vegetated
    - Vegetation composition: typical species and sub-communities. Maintain range of sub-communities with characteristic species listed in SMP (McCorry and Ryle, 2009)
    - Vegetation structure: negative indicator species – *Spartina anglica*. No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%
    - Vegetation composition: negative indicator species. Negative indicator species (including non-native species) to represent less than 5% cover.

86. The mudflat and sandflat features are, at their closest point, 0.5 km from the offshore development area. Saltmarsh habitats (*Salicornia* and other annuals colonising mud and sand [1310], and salt meadow habitats are located 1.7 km from the offshore development area at their closest point.

87. Regional data contained within the Integrated Mapping for the Sustainable Development of Ireland's Marine Resource (INFOMAR) Programme shows increasing fine sediments and muds as you move towards the inshore sheltered areas within Dublin Bay. Coughlan et al. (2021) through a detailed hydrodynamic modelling exercise of the entire Irish Sea Basin concluded that in these sheltered areas of finer sediment low seabed mobility exists, principally due to the low tidal current speeds in these areas, which have created areas of net sediment accretion (Coughlan et al., 2021).

88. The marine QIs of North Dublin Bay SAC are habitats that have formed within this area of net accretion and are thus tolerant of variation in and deposition of suspended sediments. Furthermore, based upon the modelling of sediment transport arising from the CWP Project activities, there is nil / negligible potential for increases in SSC to affect the protected habitats within this SAC. Sediment transport is predicted to travel in an easterly or southerly direction. As such, any sediment arisings resulting from the CWP Project that may reach the SAC will be so immaterial that they could not in any way contribute to an in-combination adverse effect and with the CWP project likely to make only a *de minimis* contribution to any in-combination impact on the QIs.

89. Therefore, given this *de-minimis* contribution and the expectation that the in-combination impact form any and all in-combination projects is likely to be within the natural variation of received levels, and general high tolerance of the QIs to increases in SSC and associated impacts, the CWP Project will not contribute to any in-combination adverse effect on habitat area, distribution, or community structure.

90. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

91. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Introduction of Invasive non-native species (INNS)

92. The project alone assessment concluded that with the implementation of suitable mitigation, that no adverse effects on the Conservation Objectives for the features will arise and therefore there will be no adverse effects on the site integrity of the North Dublin Bay SAC from the introduction of INNS.

Mitigation

93. All activities on the CWP Project will operate under an agreed CEMP including biosecurity management measures which will detail the measures to minimise the potential to introduce INNS into the environment. It is expected that in accordance with European Regulations and best practice all projects will apply similar controls. With this (or similar / equivalent) mitigation in place for all projects, the potential for introduction of any INNS will not result in an AESI across all in-combination plans and projects, and thus there is no AESI overall.

Residual effect

94. Following the implementation of mitigation, it is concluded that the construction, operation and decommissioning of all in-combination plans and projects will not result in any change in habitat area, distribution or community structure.

95. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

96. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.4 Codling Fault Zone SAC

3.4.1 Harbour porpoise

Table 3-10 Conservation objectives for the Codling Fault Zone SAC and summary of associated assessment of the CWP Project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
Range: Species range within the site should not be restricted by artificial barriers to site use. **Population:** Human activities should occur at levels that do not adversely affect the harbour porpoise population at the site.	Increased underwater noise:			Adverse effects on the qualifying Annex II feature (harbour porpoise) of the Codling Fault Zone SAC will not occur as a result of impacts associated with the CWP Project in-combination with other projects.
	The CWP Project has committed to implementing both a UXO MMMP and a piling MMMP. Increased underwater noise from the CWP Project in combination with other projects is not expected to result in the permanent exclusion of harbour porpoise from part of its range within the site and will not permanently prevent access for the species to suitable habitat.	No additional mitigation is required.	There is no potential for an AEoI associated with maintaining the species (harbour porpoise) range due to increased underwater noise from the CWP Project in-combination with other projects.	
	Collision risk:			
	The CWP Project has committed to implementing an EVMP. Other projects are anticipated to comply with Marine Wildlife Watching Codes. Collision risk from the CWP	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of collision risk from the	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	Project in-combination with other projects is not expected to: - result in the permanent exclusion of harbour porpoise from part of its range within the site and permanently prevent access for the species to suitable habitat; and - adversely affect the harbour porpoise population at the site.		CWP Project in-combination with other projects.	
	Changes in prey availability:			
	Changes in prey availability from the CWP Project in-combination with other projects will not cause barriers to site use and are not expected to adversely affect the harbour porpoise population at the site.	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the site from changes in prey availability from the CWP Project in-combination with other projects.	
	Changes in available habitat:			
	Changes in available habitat from CWP Project in-combination with other projects are not expected to: - result in the permanent exclusion of harbour porpoise from part of its	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the site from changes in available habitat from the CWP Project in-combination with other projects.	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	range within the site and permanently prevent access for the species to suitable habitat; and - adversely affect the harbour porpoise population at the site.			

Increased underwater noise

97. Target 2 of the Conservation Objectives states that *"proposed activities or operations should not introduce man-made energy (e.g. aerial or underwater noise, light or thermal energy) at levels that could result in a significant negative impact on individuals and / or the population of harbour porpoise within the site"*.

98. The Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with the Codling Fault Zone SAC from increased underwater noise, either ex situ or in situ.

Assessment of the Project In-Combination

99. This assessment focuses on the potential in-combination impact of construction activities at other offshore projects in the Celtic and Irish Sea MU for porpoise in 2027 (the same year as piling at the CWP project). As outlined in **EIAR Chapter 11, Appendix 11.1 Cumulative effects assessment for marine mammals**, there are expected to be seven other OWFs in the Celtic and Irish Sea MU that will be constructing in 2027 as well as two tidal projects, three coastal projects and one cable project (

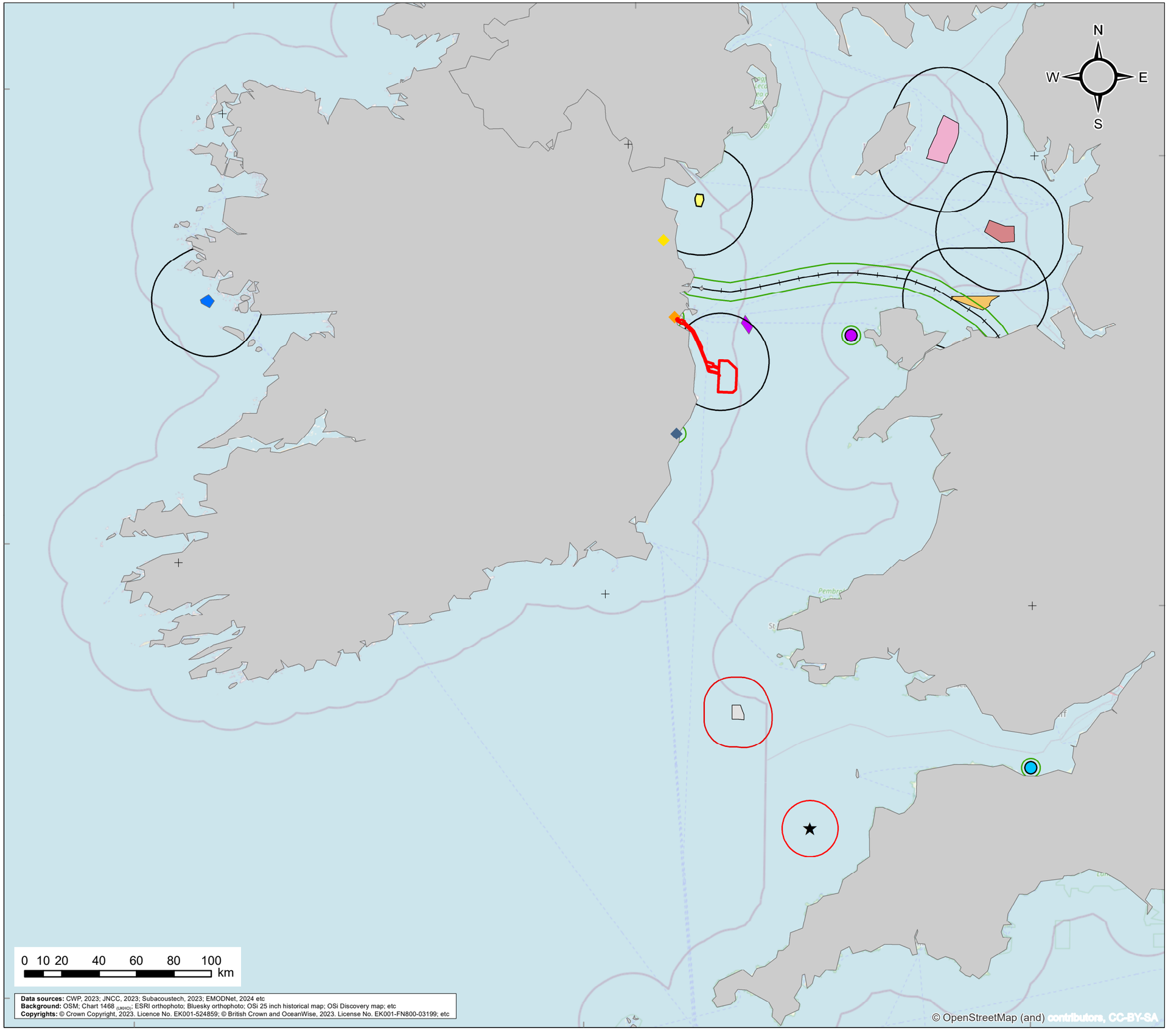
100. **Table** 3-11). As such, these offshore projects have been screened into the in-combination assessment for disturbance from underwater noise for harbour porpoise.

Table 3-11 Offshore projects constructing in the Celtic and Irish Sea MU in 2027

Project	Tier	Type
Codling	-	OWF
Awel y Môr	1	OWF
Erebus Floating Wind Demo	1	Floating
White Cross	1	Floating
West Somerset Tidal Lagoon	1	Tidal
Arklow Waste Water Treatment	1	Coastal
Maintenance dredging River Boyne, Drogheda	1	Coastal
North Wall Emergency Power Generation Plant	1	Coastal
Oriel	2b	OWF
Sceirde Rocks	2a	OWF
Morecambe	2b	OWF
Isle of Man	2b	OWF
Mares Connect	3	Cable
Holyhead Deep	3	Tidal

101. To quantitatively assess the potential for disturbance to the SAC for each of the projects in-combination, a 26 km (fixed) or 15 km (floating (i.e., anchor pile installation) and / or jacket (pin) pile installation) EDR was assumed as an indicative disturbance area for each OWF project (this follows the guidance in JNCC (2020) for disturbance assessments to porpoise SACs in England, Wales and Northern Ireland where 26 km EDR is advised for monopiles and 15 km EDR is advised for pin-piles). Additionally, it was assumed that coastal, tidal and cable projects require no piling activities and thus disturbance effects during construction are expected to be limited to activities such as dredging, trenching, cable laying, vessel activity etc for which a maximum 5 km EDR has been assumed (as per (McQueen et al., 2020) for dredging activities).

102. With regards in situ effects the CWP project was the only project to have disturbance contours that overlapped with the boundary of the Codling Fault Zone SAC; as such, there is no in-combination effect of disturbance to porpoise within the site (**Figure 3-2**). With regards ex situ effects, the level of disturbance predicted to occur within the Celtic and Irish Sea MU between 2023 and 2028, and in particular in 2027, 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. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the SAC from an increase in underwater noise from construction activities from CWP Project in-combination with other projects, either ex situ or in situ.



Legend

- Planning application boundary
- 5 km EDR
- 15 km EDR
- 26 km EDR
- North Wall Power Plant
- Arklow Waste Treatment Plant
- Dogheda Maintenance Dredge
- West Somerset Lagoon Tidal
- Holyhead Deep Tidal
- Mares Connect
- Whitecross
- Sceirde Rocks
- Oriel
- Awel y Mor
- Isle of Man
- Morcambe
- Erebus (Floating)
- Codling Fault Zone SAC

codling wind park

Project: Codling Wind Park

SMRU Consulting
understand • assess • mitigate

Figure 3.2:
26 km EDR for piling in combination with the 5 km, 15 km and 26 km EDR from other construction projects, in relation to the Codling Fault Zone SAC designated for harbour porpoise

CWP doc. number: CWP-SMR-ENG-08-01-MAP-1676

Internal descriptive code:
IRE - PAB_DPNM.THRESH.5EDR.15EDR.26EDR.CONT - ARK.WASTE.TP..AWEL..DOGHEDA.MAIN.DREDGE..EREBUS..HOLYDEEP.TIDAL..ISLE.OF.MAN..MARES.CONNECT..MORCAMBE..NORTH.WALL.PP..ORIEL..SCEIRDE.ROCKS..WEST.SOMER.LAG.TIDAL..WHITECROSS..CODLING.FZ.SAC - (NIS.Vol.06.a.Sec.03.FIG.09)

Size: A3
Scale: 1:2,000,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
A	Final version	2024/07/17	JC	RRS/EA	JM

Vessel collision

103. Target 2 of the Conservation Objectives states that *"proposed activities or operations should not cause death or injury to individuals to an extent that may ultimately affect the harbour porpoise population at the site"*.

104. The Project alone assessment concluded that, giving consideration to primary mitigation measures, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from collision risk, either ex situ or in situ.

Assessment of the Project In-Combination

105. The risk of collision to marine mammals is expected to be primarily localised to within the boundaries of the respective projects. None of the project boundaries overlap with the Codling Fault Zone SAC. The vessel routes and potential ports used by other offshore projects are unknown, and therefore it is not possible to estimate the expected level of vessel activity within the Codling Fault Zone SAC from other projects. However, it is assumed that in accordance with industry standard practice all other offshore projects in the Celtic and Irish Sea MU will either adopt a VMP or follow best practice codes of conduct on vessel handing around marine mammals[10] to minimise any potential effects on marine mammals and reduce risk of collision. As such, the potential for collision risk from CWP Project in-combination with other projects is considered negligible.

106. No harbour porpoise within the SAC are expected to experience death or injury from vessel collisions and as such, risk of collision will not adversely affect the harbour porpoise community at the site. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from collision risk from the CWP Project in-combination with other projects, and no AESI overall.

Changes in prey availability

107. Target 2 of the Conservation Objectives states that "*Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site. This target also relates to proposed activities or operations that may result in the deterioration of key resources (e.g. water quality, feeding, etc.) upon which harbour porpoise depend*".

108. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with the Codling Fault Zone SAC from changes in prey availability, either ex situ or in situ.

Assessment of the Project In-Combination

109. Where multiple projects may impact upon harbour porpoise fish prey species or the habitats that support the prey within the site, there is the potential for in-combination indirect effects on the harbour porpoise community. Therefore, projects with the potential to act in-combination with CWP are those where the spatial footprint of activities (e.g., underwater noise, seabed disturbance) may encroach upon the SAC.

[10] E.g. IWDG code of conduct (https://iwdg.ie/cms_files/wp-content/uploads/2022/06/Code-of-Conduct-When-Encountering-Whales-And-Dolphins-A3-Document.pdf), Sea Wise Code advised by NRW (https://naturalresources.wales/media/3513/sea-wise-code.pdf), South and West Wales seabird and seal code of conduct (https://www.welshwildlife.org/nature-reserves/code-conduct-seabirds-and-seals).

110. To inform this NIS, **Chapter 9 Fish, Shellfish and Turtle Ecology** of the EIAR prepared for the Project was referred to. The EIAR concludes that there will be no significant impact to any fish species from any impact pathway during the construction, operation or decommissioning of the CWP Project alone (this includes direct damage, disturbance, increased suspended sediment concentration (SSC) and sediment deposition, release of seabed contaminants, underwater noise etc).

111. Considering the conclusions for the Project Alone assessment, the potential for CWP to provide a non-negligible contribution to in-combination effects on prey availability alongside other projects is considered to be remote. To inform this NIS assessment, the assessment of potential cumulative effects on fish and shellfish receptors carried out as a part of the EIAR (**Chapter 9 Fish, Shellfish and Turtle Ecology**) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to harbour porpoise prey species within the SAC, it does assess the broader potential for cumulative effects to these wide-ranging fish species to result from CWP in combination with relevant projects, including OWF projects on the east coast of Ireland, including Arklow Bank, Dublin Array and NISA. The EIAR concluded that impacts such as temporary habitat loss or disturbance, long-term habitat loss and increased suspended sediments concentrations are expected to occur over a spatial extent which is very small relative to the wider area over which developments occur, and relative to the size of available spawning and nursery areas for fish. Therefore, these impacts are considered negligible in the context of the wider availability of suitable habitat for marine mammal prey species. In summary, the cumulative assessment for fish and shellfish does not identify any significant cumulative effects resulting from the CWP Project alongside other projects. As such, it is anticipated that during the construction phase and any maintenance / decommissioning activities at CWP and other projects, any impacts to harbour porpoise prey availability will be negligible.

112. Considering the above, there is expected to be no long-term change to harbour porpoise prey species presence, abundance, condition or diversity; as such, there will be no deterioration of key resources (feeding) upon which harbour porpoises depend. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise community from changes in prey availability from the CWP Project in-combination with other projects, and no AESI overall.

Changes in available habitat

113. Target 1 of the Conservation Objectives states that *"Species range within the site should not be restricted by artificial barriers to site use. This target may be considered relevant to proposed activities or operations that will result in the permanent exclusion of harbour porpoise from part of its range within the site or will permanently prevent access for the species to suitable habitat therein"*.

114. To recap, the Project Alone assessment concluded that there is no potential for an Impediment to the Conservation Objectives of the harbour porpoise community associated with Codling Fault Zone SAC from changes in available habitat, either ex situ or in situ.

Assessment of the Project In-Combination

115. While offshore projects within the Celtic and Irish Sea MU have the potential to cause disturbance impacts to harbour porpoise, like CWP Project alone, the behavioural effects will be short-lived, and animals are expected to return to baseline activities following the cessation of activities. As such, no activities at any project are expected to result in the permanent exclusion of harbour porpoise from part of their range within the Codling Fault Zone SAC.

116. Considering the above, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from changes in available habitat from the CWP Project in-combination with other projects, and no AESI overall.

3.5 Lambay Island SAC (IE000204)

3.5.1 Grey seals [1364] and harbour seals [1365]

Table 3-12 Conservation objectives for the Lambay Island SAC and summary of associated assessment of the CWP Project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
Access to suitable habitat: The species range within the site is not restricted by artificial barriers to site use. **Breeding/moulting/resting behaviour:** Conserve the breeding/moult-haul out/resting haul-out sites in a natural condition. **Disturbance:** Human activities should occur at levels that do not adversely affect the grey and harbour seal population at the site.	Increased underwater noise: The CWP Project has committed to implementing both a UXO MMMP and a piling MMMP. Other projects are anticipated to comply with 'industry standards' and follow the NPWS (2014) guidance. Increased underwater noise at the CWP Project in-combination with other projects is not expected to: - adversely affect the access to suitable habitat within the site; - affect the conservation of breeding/moult-haul out/resting haul-out sites in a natural condition; - result in a significant negative impact (disturbance and death/injury) on harbour seal population or deterioration of	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the grey and harbour seal feature of the site as a result of increased underwater noise from CWP Project in-combination with other projects.	Adverse effects on the qualifying Annex II features (grey and harbour seals) of the Lambay Island SAC will not occur as a result of impacts associated with the CWP Project in-combination with other Plans and Projects..

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	key resources upon which seals depend.			
	Collision risk:			
	The CWP Project has committed to implementing an EVMP. Other projects are anticipated to comply with Marine Wildlife Watching Codes. Collision risk from the CWP Project in-combination with other projects is not expected to: - affect the access to suitable habitat within the site; - affect the conservation of breeding / moult-haul out/resting haul-out sites in a natural condition; and - result in a significant negative impact (death/injury) on grey and harbour seal population within the site.	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the grey and harbour seal feature of the site as a result of collision risk from the CWP Project in-combination with other projects.	
	Changes in prey availability:			
	Changes in prey availability from the CWP Project in-combination with other projects are not expected to: - affect the conservation of breeding/moult-haul	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the grey and harbour seal feature of the site from changes in prey availability from the CWP Project in-	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	out/resting haul-out sites in a natural condition; - result in deterioration of key resources upon which grey and harbour seal depend to the extent that could affect seal populations at the site; and - restrict the access to suitable habitat (no impact pathway).		combination with other projects.	
	Changes in available habitat:			
	Changes in available habitat from the CWP Project in-combination with other projects is not expected to: - adversely affect the access to suitable habitat within the site; - affect the conservation of breeding/moult-haul out/resting haul-out sites in a natural condition; - result in deterioration of key resources upon which grey and harbour seal depend to the extent that could affect seal populations at the site.	No additional mitigation is required.	There is no potential for AEoI to the Conservation Objectives of the grey and harbour seal feature of the site from changes in available habitat from the CWP Project in-combination with other projects.	

Increased underwater noise

117. Targets 2, 3 and 4 state that disturbance should not affect the natural condition of the breeding site / moulting haul-outs sites and resting haul-out sites. Target 5 of the Conservation Objectives states that disturbance from "*Human activities should occur at levels that do not adversely affect the harbour/grey seal population at the site*" (NPWS, 2013).

118. The Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is no potential for an impediment to the Conservation Objectives of the harbour / grey seal population associated with the Lambay Island SAC from increased underwater noise, either ex situ or in situ.

Assessment of the Project In-Combination

119. This assessment focuses on the potential in-combination impact of construction activities at other offshore projects in the seal MU in 2027 (the same year as piling at the CWP project). As outlined in **EIAR Chapter 11, Appendix 11.1 Cumulative effects assessment for marine mammals**, there are expected to be one other OWF that will be constructing in 2027 as well as three coastal projects and one cable project (**Table 3-13**). As such, these offshore projects have been screened into the in-combination assessment for disturbance from underwater noise for harbour and grey seals.

Table 3-13 Offshore projects constructing in the MU in 2027

Project	Tier	Type
Codling	-	OWF
Arklow Waste Water Treatment	1	Coastal
Maintenance dredging River Boyne, Drogheda	1	Coastal
North Wall Emergency Power Generation Plant	1	Coastal
Oriel	2b	OWF
Mares Connect	3	Cable

120. To quantitatively assess the potential for disturbance to the SAC for each of the projects in-combination, a 26 km (fixed) EDR was assumed as an indicative disturbance area for each OWF project (this follows the guidance in JNCC (2020) for disturbance assessments to porpoise SACs in England, Wales and Northern Ireland where 26 km EDR is advised for monopiles). Additionally, it was assumed that coastal and cable projects require no piling activities and thus disturbance effects during construction are expected to be limited to activities such as dredging, trenching, cable laying, vessel activity etc for which a maximum 5 km EDR has been assumed (as per (McQueen et al., 2020) for dredging activities).

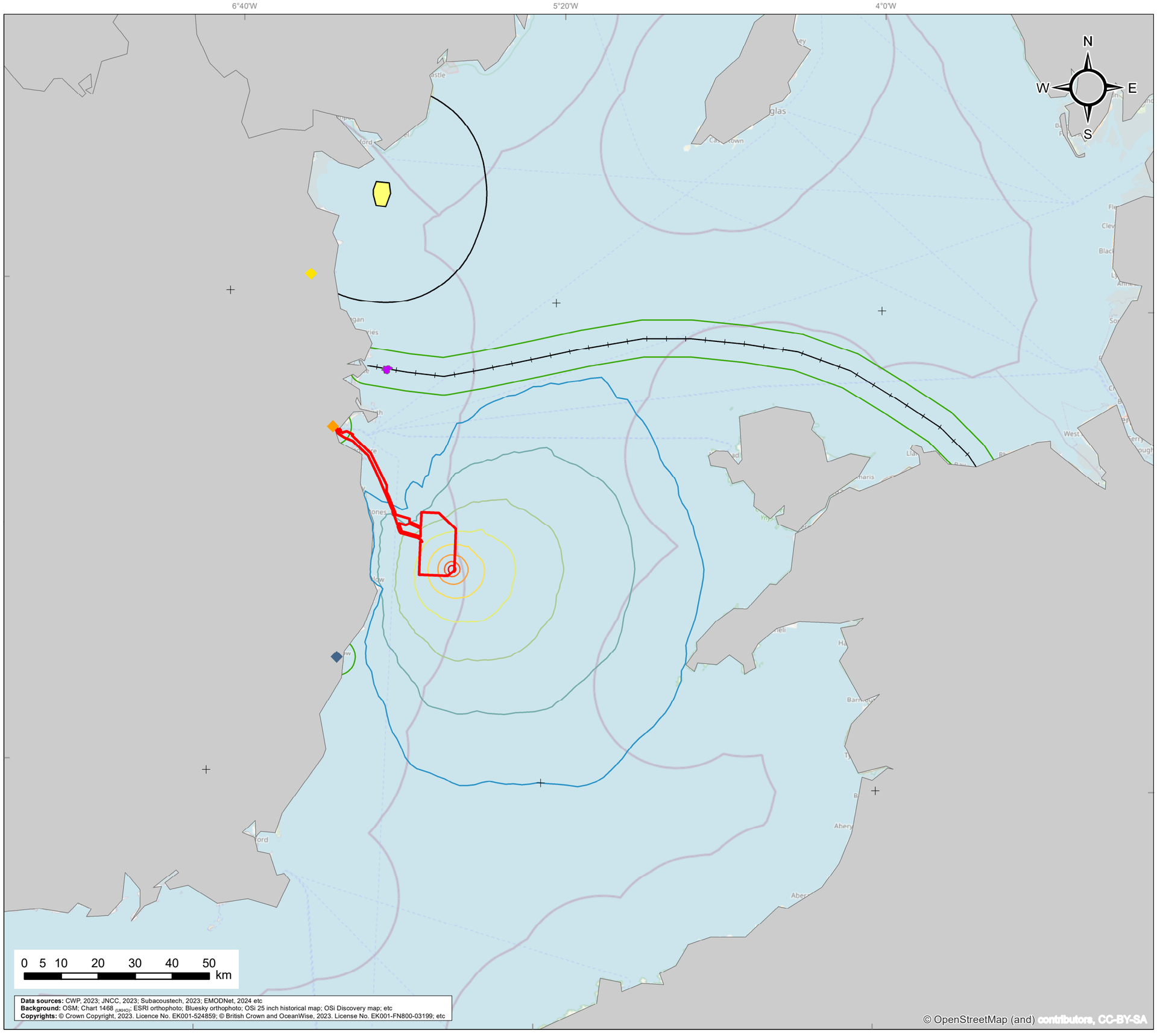
121. With regards in situ effects the Mares Connect Interconnector cable was the only project to have disturbance contours that overlapped with the boundary of the Lambay Island SAC (**Figure 3-3**). At the time of writing, there is no EIAR available for the Mares Connect Interconnector and thus the potential impacts to marine mammals have not yet been quantified. The project will involve installation of sub-sea cables, the impacts of which are expected to be temporary and transient and limited to disturbance from vessel activities and trenching activities for cable laying. The Mares Connect website

and Project Brochure[11] state that "*Steps are taken during the design of the project to ensure that environmental impacts are minimised where possible e.g., drilling under sensitive coastal features, using a Horizontal Direction Drill (HDD); routeing around sensitive offshore habitats; […]. Best practice will also be followed to further reduce the significance of any potential impacts of the project*". It is expected that a vessel management plan will be put in place to ensure the risk of disturbance to seals at the Lambay Island SAC is minimised. Disturbance from vessels and trenching activities may result in temporary changes in behaviour and / or distribution of 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.

122. With regards ex situ effects, the level of disturbance predicted to occur within the Celtic and Irish Sea MU between 2023 and 2028, and in particular in 2027, 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. There is, therefore, no potential for impediment to the Conservation Objectives of the grey seal, harbour seal, or harbour porpoise feature of the SAC from an increase in underwater noise from construction activities from CWP Project in-combination with other projects, either ex situ or in situ.

123. There is, therefore, no potential for impediment to the Conservation Objectives of the marine mammal features of the SAC from an increase in underwater noise from construction activities from CWP Project in-combination with other projects, and no AESI overall.

[11] https://maresconnect.ie/wp-content/uploads/2023/11/MaresConnect-Brochure-Public-Consultation-Autumn-2023.pdf



Legend

- Planning application boundary
- SEL_{ss} dB re μPa^2s (5dB) SE location
- 145 dB
- 150 dB
- 155 dB
- 160 dB
- 165 dB
- 170 dB
- 175 dB
- 180 dB
- 5 km EDR
- 25 km EDR
- North Wall Power Plant
- Arklow Waste Treatment Plant
- Dogheda Maintenance Dredge
- Mares Connect
- Oriel
- Lambay Island SAC

codling wind park

Project: Codling Wind Park

SMRU Consulting
understand • assess • mitigate

Figure 3.3:
Disturbance contours for piling at the Southeast modelling location using the seal dose-response function, in combination with the 5 km and 25 km EDR from other wind farms in relation to the Lambay Island SAC

CWP doc. number: CWP-SMR-ENG-08-01-MAP-1686

Internal descriptive code:
IS - PAB..DPNM.CONT.WTG.SE..THRESH.SEDR.25EDR.CONT - ARK.WASTE.TP..DOGHEDA.MAIN.DREDGE..MARES.CONNECT..NORTH.WALL.PP..ORIEL..LAMBAY.ISL.SAC - (NIS.Vol.06.a.Sec.03.FIG.19)

Size: A3
Scale: 1:1,000,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
A	Final version	2024/07/17	JC	RRS/EA	JM

Vessel collision

124. Target 5 of the Conservation Objectives states that *"Proposed activities or operations should not cause death or injury to individuals to an extent that may ultimately affect the harbour/grey seal population at the site"* (NPWS, 2013).

125. The Project alone assessment concluded that, giving consideration to primary mitigation measures, there is expected to be no potential for impediment to the Conservation Objectives of the harbour / grey seal population from collision risk, either ex situ or in situ.

Assessment of the Project In-Combination

126. The risk of collision to marine mammals is expected to be primarily localised to within the boundaries of the respective projects. The only project that overlaps with the Lambay Island SAC is the Mares Connect cable. None of the other project boundaries overlap with the Lambay Island SAC. The vessel routes and potential ports used by other offshore projects are unknown, and therefore it is not possible to estimate the expected level of vessel activity within the Lambay Island SAC from other projects. However, it is assumed that all other offshore projects will either adopt a VMP or follow best practice codes of conduct on vessel handing around marine mammals to minimise any potential effects on marine mammals and reduce risk of collision. As such, the potential for collision risk from CWP Project in-combination with other projects is considered negligible.

127. No harbour or grey seals within the SAC are expected to experience death or injury from vessel collisions and as such, risk of collision will not adversely affect the harbour / grey seal population at the site. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the harbour / grey seal population from collision risk from the CWP Project in-combination with other projects, and no AESI overall.

Changes in prey availability

128. Target 5 of the Conservation Objectives states *"Human activities should occur at levels that do not adversely affect the harbour/grey seal population at the site"*, specifically, this target also relates to *"proposed activities or operations that may result in the deterioration of key resources (e.g. water quality, feeding, etc) upon which harbour/grey seals depend"* (NPWS, 2013).

129. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives of the grey and harbour seal community associated with the Lambay Island SAC from changes in prey availability, either ex situ or in situ.

Assessment of the Project In-Combination

130. Where multiple projects may impact upon seal fish prey species or the habitats that support the prey within the site, there is the potential for in-combination indirect effects on the seal population. Therefore, projects with the potential to act in-combination with CWP are those where the spatial footprint of activities (e.g., underwater noise, seabed disturbance) may encroach upon the SAC.

131. To inform this NIS, **Chapter 9 Fish, Shellfish and Turtle Ecology** of the EIAR prepared for the Project was referred to. The EIAR concludes that there will be no significant impact to any fish species from any impact pathway during the construction, operation or decommissioning of the CWP Project alone (this includes direct damage, disturbance, increased suspended sediment concentration (SSC) and sediment deposition, release of seabed contaminants, underwater noise etc.).

132. Considering the conclusions for the Project Alone assessment, the potential for CWP to provide a non-negligible contribution to in-combination effects on prey availability alongside other projects is considered to be remote. To inform this NIS assessment, the assessment of potential cumulative effects on fish and shellfish receptors carried out as a part of the EIAR (**Chapter 9 Fish, Shellfish and Turtle Ecology**) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to seal prey species within the SAC, it does assess the broader potential for cumulative effects to these wide-ranging fish species to result from CWP in combination with relevant projects, including OWF projects on the east coast of Ireland, including Arklow Bank, Dublin Array and NISA. The EIAR concluded that impacts such as temporary habitat loss or disturbance, long-term habitat loss and increased suspended sediments concentrations are expected to occur over a spatial extent which is very small relative to the wider area over which developments occur, and relative to the size of available spawning and nursery areas for fish. Therefore, these impacts are considered negligible in the context of the wider availability of suitable habitat for marine mammal prey species. In summary, the cumulative assessment for fish and shellfish does not identify any significant cumulative effects resulting from the CWP Project alongside other projects. As such, it is anticipated that during the construction phase and any maintenance / decommissioning activities at CWP and other projects, any impacts to seal prey availability will be negligible.

133. Considering the above, there is expected to be no long-term change to harbour or grey seal prey species presence, abundance, condition or diversity; as such, there will be no deterioration of key resources (feeding) upon which seals depend. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour or grey seal population from changes in prey availability from the CWP Project in-combination with other projects, and no AESI overall.

Changes in available habitat

134. Target 1 of the Conservation Objectives states that *"Species range within the site should not be restricted by artificial barriers to site use. This target may be considered relevant to proposed activities or operations that will result in the permanent exclusion of harbour/grey seal from part of its range within the site or will permanently prevent access for the species to suitable habitat therein"* (NPWS, 2013).

135. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives of the harbour or grey seal population associated with the Lambay Island SAC from changes in available habitat, either ex situ or in situ.

Assessment of the Project In-Combination

136. While offshore projects within the MU have the potential to cause disturbance impacts to harbour and grey seals, like CWP Project alone, the behavioural effects will be short-lived, and animals are expected to return to baseline activities following the cessation of activities.

137. None of the activities associated with the construction, operation and decommissioning of any of the projects are expected to result in the permanent alteration of the terrestrial, intertidal or subtidal (aquatic) habitats that support breeding, moulting and resting behaviours of the seals within the SAC. Therefore, the integrity of the breeding, moulting and resting sites for both species is expected to be maintained in a natural condition.

138. Considering the above, there is expected to be no potential for impediment to the Conservation Objectives for the harbour or grey seal population from changes in available habitat from the CWP Project in-combination with other projects, and no AESI overall.

3.5.2 Harbour porpoise

139. Lambay Island is located 4 km off Portrane on the north Co. Dublin coast. The SAC is 4.04 km^2 and encompasses the entire island in addition to very small area of the intertidal and subtidal areas immediately around it. In March 2024, harbour porpoise were added as a Qualifying Interest to the Lambay Island SAC. While the Site Synopsis was amended in March 2024 to list harbour porpoise, it provides no information on the presence of porpoise within the site, or the importance of the site for harbour porpoise.

140. Since the Lambay Island SAC is primarily on land, and is located within the Rockabill to Dalkey Island SAC (for which a full assessment has been provided), it is not assessed separately here for harbour porpoise. The conclusion of no potential AESI either for CWP alone or in-combination with other Plans and Projects remains applicable for this SAC.

3.6 North Anglesey Marine SAC (UK0030398)

3.6.1 Harbour porpoise

Table 3-14 Conservation objectives for the North Anglesey Marine SAC and summary of associated assessment of the CWP Project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
Range: Harbour porpoise is (i.e., remains) a viable component of the site. **Population:** There is no significant disturbance of the species. **Habitat:** The condition of supporting habitats and processes, and the availability of prey is maintained.	Increased underwater noise:			Adverse effects on the qualifying Annex II feature (harbour porpoise) of the North Anglesey Marine SAC will not occur as a result of impacts associated with the CWP Project in-combination with other Projects.
	The CWP Project has committed to implementing both a UXO MMMP and a piling MMMP. Other projects are anticipated to comply with 'industry standards' and follow the NPWS (2014) guidance. Increased underwater noise at CWP Project in-combination with other projects is not expected to: - restrict the survivability and reproductive potential of harbour porpoise using the site to the extent that could adversely affect the FCS; - lead to the exclusion of harbour porpoise from a significant proportion of the site for a significant period of time, in line with thresholds set in JNCC (2019b); and	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of increased underwater noise from CWP Project in-combination with other projects.	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	- impact the supporting habitats and processes (no impact pathway).			
	Collision risk:			
	The CWP Project has committed to implementing an EVMP. Other projects are anticipated to comply with Marine Wildlife Watching Codes. Collision risk from CWP Project in-combination with other projects is not expected to: - restrict the survivability and reproductive potential of harbour porpoise using the site to the extent that could adversely affect the FCS; - contribute to disturbance of the species (no impact pathway); and - impact the supporting habitats and processes (no impact pathway).	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of collision risk from CWP Project in-combination with other projects.	
	Changes in prey availability:			
	Changes in prey availability from CWP Project in-combination with other projects are not expected to: - restrict the survivability and reproductive potential of harbour porpoise using the site to the	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of changes in prey	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	extent that could adversely affect the FCS; - adversely affect the maintenance of supporting habitats and processes relevant to harbour porpoises and their prey within the site; and - contribute to disturbance of the species (no impact pathway).		availability from CWP Project in-combination with other projects.	
	Changes in available habitat:			
	Changes in available habitat from CWP Project in-combination with other projects are not expected to: - restrict the survivability and reproductive potential of harbour porpoise using the site to the extent that could adversely affect the FCS; - adversely affect the maintenance of supporting habitats and processes relevant to harbour porpoises and their prey within the site; and - contribute to disturbance of the species (no impact pathway).	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of changes in available habitat from CWP Project in-combination with other projects.	

Impact 1: Increased underwater noise

141. The Conservation Objectives of relevance are to ensure that *"harbour porpoise is a viable component of the site"* (minimise the risk of injury) and to ensure that *"there is no significant disturbance of the species"*.

142. The Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is no potential for an impediment to the Conservation Objectives of the harbour porpoise associated with the North Anglesey Marine SAC from increased underwater noise, either ex situ or in situ.

Assessment of the Project In-Combination

143. It is assumed that all offshore projects will put in place mitigation to reduce the risk of auditory injury (PTS) to negligible levels.

144. This assessment focuses on the potential in-combination impact of construction activities at other offshore projects in the Celtic and Irish Sea MU for porpoise in 2027 (the same year as piling at the CWP Project). As outlined in **EIAR Chapter 11, Appendix 11.1 Cumulative effects assessment for marine mammals**, there are expected to be seven other OWFs in the Celtic and Irish Sea MU that will be constructing in 2027 as well as two tidal projects, three coastal projects and one cable project (**Table 3-15**). As such, these offshore projects have been screened in to the in-combination assessment for disturbance from underwater noise for harbour porpoise.

Table 3-15 Offshore projects constructing in the Celtic and Irish Sea MU in 2027

Project	Tier	Type
Codling	-	OWF
Awel y Môr	1	OWF
Erebus Floating Wind Demo	1	Floating
White Cross	1	Floating
West Somerset Tidal Lagoon	1	Tidal
Arklow Waste Water Treatment	1	Coastal
Maintenance dredging River Boyne, Drogheda	1	Coastal
North Wall Emergency Power Generation Plant	1	Coastal
Oriel	2b	OWF
Sceirde Rocks	2a	OWF
Morecambe	2b	OWF
Isle of Man	2b	OWF
Mares Connect	3	Cable
Holyhead Deep	3	Tidal

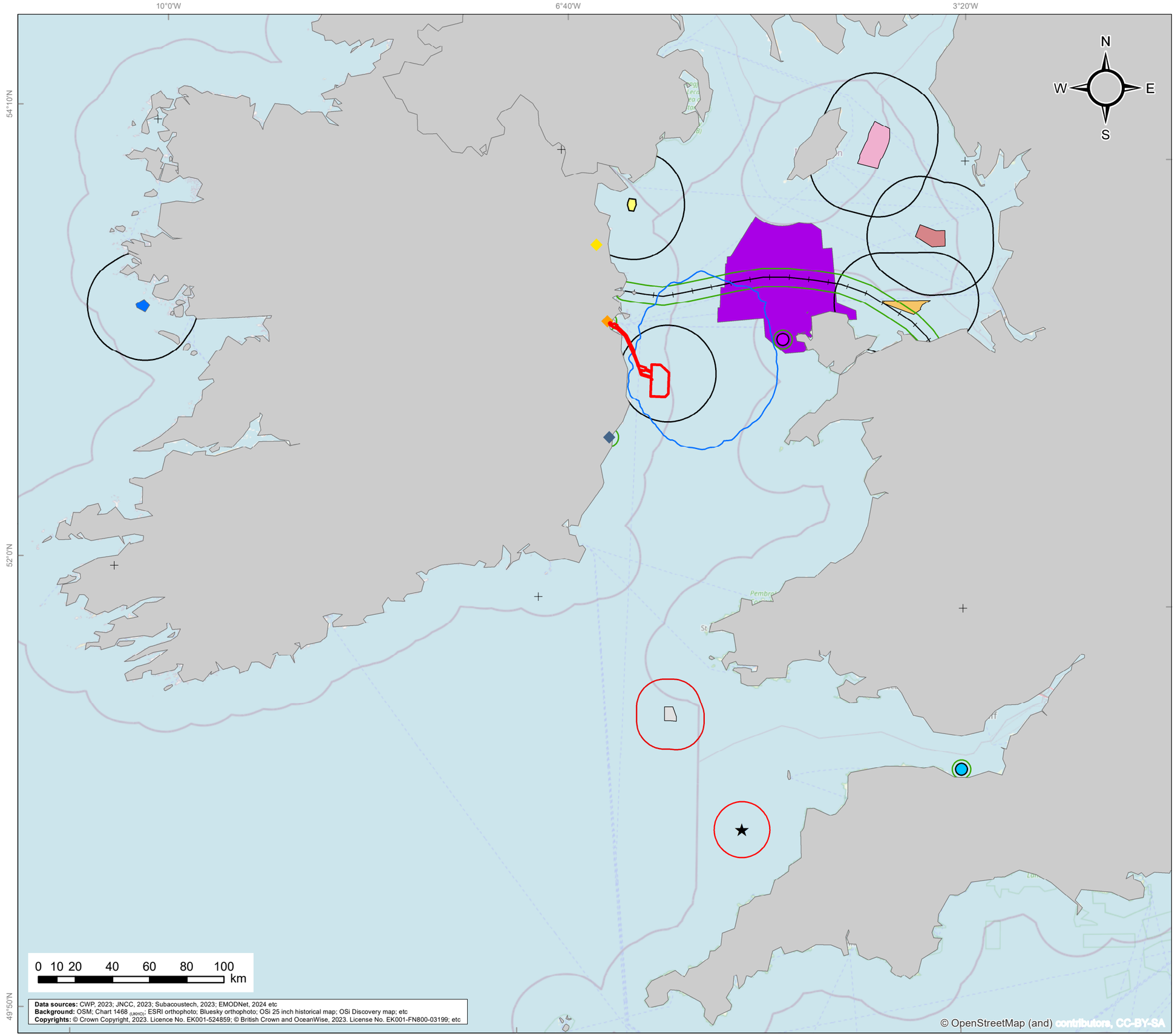
145. To quantitatively assess the potential for disturbance to the SAC for each of the projects in-combination, a 26 km (fixed) or 15 km (floating (i.e., anchor pile installation) and / or jacket (pin) pile installation) EDR was assumed as an indicative disturbance area for each OWF project (this follows the guidance in JNCC (2020) for disturbance assessments to porpoise SACs in England, Wales and Northern Ireland where 26 km EDR is advised for monopiles and 15 km EDR is advised for pin-piles). Additionally, it was assumed that coastal, tidal and cable projects require no piling activities and thus disturbance effects during construction are expected to be limited to activities such as dredging, trenching, cable laying and vessel activity for which a maximum 5 km EDR has been assumed (as per (McQueen et al., 2020) for dredging activities).

146. With regards in situ effects, the CWP Project, the Awel y Môr OWF and the Mares Connect cable were the only projects to have disturbance contours that overlapped with the boundary of the North Anglesey Marine SAC (see **Table 3-16** and **Figure 3-4**). Combined, the three projects impact 16.9% of the SAC area. This level of overlap does not constitute a significant disturbance, as it remains below the 20% daily threshold outlined within the Conservation Objectives.

147. With regards ex situ effects, the level of disturbance predicted to occur within the Celtic and Irish Sea MU between 2023 and 2028, and in particular in 2027, 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. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the SAC from an increase in underwater noise from construction activities from CWP Project in-combination with other projects, either ex situ or in situ.

Table 3-16 Predicted overlap of disturbance contours from each OWF project constructing in 2027 and the boundary of the North Anglesey Marine SAC

Project	Type	Disturbance threshold	SAC overlap (km^2)
Codling	OWF	145 dB SELss	461.5 km^2 (14.2% SAC)
		26 km EDR	0
Awel y Môr	OWF	26 km EDR	7.7 km^2 (0.2% SAC)
Morecambe	OWF	26 km EDR	0
Erebus (floating)	OWF	15 km EDR	0
White Cross	OWF	26 km EDR	0
Sceirde Rocks	OWF	26 km EDR	0
Oriel	OWF	26 km EDR	0
Isle of Man	OWF	26 km EDR	0
West Somerset Tidal Lagoon	Tidal	5 km EDR	0
Arklow Waste Water Treatment	Coastal	5 km EDR	0
Maintenance dredging River Boyne, Drogheda	Coastal	5 km EDR	0
North Wall Emergency Power Generation Plant	Coastal	5 km EDR	0
Mares Connect	Cable	5 km EDR	78.5 km^2 (2.4% SAC)
Holyhead Deep	Tidal	5 km EDR	0



Legend

- Planning application boundary
- SEL_{ss} 145 dB re µPa²s threshold
- 5 km EDR
- 15 km EDR
- 26 km EDR
- North Wall Power Plant
- Arklow Waste Treatment Plant
- Dogheda Maintenance Dredge
- West Somerset Lagoon Tidal
- Holyhead Deep Tidal
- Mares Connect
- Whitecross
- Sceirde Rocks
- Oriel
- Awel y Mor
- Isle of Man
- Morcambe
- Erebus (Floating)
- North Anglesey Marine SAC

codling wind park

Project: Codling Wind Park

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Figure 3.4:
Disturbance thresholds for piling in combination with the 5 km, 15 km and 26 km EDR from other construction projects, in relation to the North Anglesey Marine SAC designated for harbour porpoise

CWP doc. number: CWP-SMR-ENG-08-01-MAP-1679

Internal descriptive code: IRE - PNB_DPNN.THRESH.SEL.SEQR.15EDR.26EDR.CONT - ARK.WASTE.TP, AWEL.DOGHEDA.MAIN.DREDGE, EREBUS, HOLY.DEEP.TIDAL, ISLE.OF.MAN, MARES.CONNECT, MORCAMBE, NORTH.WALL.PP, ORIEL, SCEIRDE.ROCKS, WEST.SOMER.LAG.TIDAL, WHITECROSS, NORTH.ANGLESEY.MARINE.SAC - (NIS.Vol.06.a.Sec.03.FIG.12)

Size: A3
Scale: 1:2,000,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
A	Final version	2024/07/17	JC	RRS/EA	JM

Impact 2: Collision risk

148. The Conservation Objective of relevance is to ensure that *"harbour porpoise is a viable component of the site"* (minimise the risk of injury).

149. The Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is no potential for an impediment to the Conservation Objectives for harbour porpoise within the North Anglesey Marine SAC from collisions with Project vessels.

Assessment of the Project In-Combination

150. The risk of collision to harbour porpoise is expected to be primarily localised to within the boundaries of the respective projects. With the exception of the Mares Connect cable project, none of the boundaries of the other offshore projects overlap with the North Anglesey Marine SAC. The vessel routes and potential ports used by other offshore projects are unknown, and therefore it is not possible to estimate the expected level of vessel activity within the North Anglesey Marine SAC from other projects. However, it is assumed that in accordance with standard practice all other offshore projects in the Celtic and Irish Sea MU will either adopt a VMP or follow best practice codes of conduct on vessel handing around marine mammals[12] to minimise any potential effects on marine mammals and reduce risk of collision. As such, the potential for collision with vessels from the CWP Project in-combination with other projects within the SAC is considered negligible.

151. No harbour porpoise within the SAC are expected to experience death or injury from vessel collisions and as such, risk of collision will not adversely affect the harbour porpoise at the site. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise from collision risk from the CWP Project in-combination with other projects, and no AESI overall.

Impact 3: Changes in prey availability

152. The Conservation Objective of relevance is to ensure *"the condition of supporting habitats and processes, and the availability of prey is maintained"*.

153. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives for harbour porpoise associated with the North Anglesey Marine SAC from changes in prey availability.

Assessment of the Project In-Combination

154. Where multiple projects may impact upon harbour porpoise fish prey species or the habitats that support the prey within the site, there is the potential for in-combination indirect effects on the harbour porpoise community. Therefore, projects with the potential to act in-combination with CWP are those where the spatial footprint of activities (e.g., underwater noise, seabed disturbance) may encroach upon the SAC. To inform this NIS assessment, the assessment of potential cumulative effects on fish and shellfish receptors carried out as a part of the EIAR (**Chapter 9 Fish, Shellfish and Turtle Ecology**) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to harbour porpoise prey species within the SAC, it does assess the broader potential for cumulative

[12] E.g. IWDG code of conduct (https://iwdg.ie/cms_files/wp-content/uploads/2022/06/Code-of-Conduct-When-Encountering-Whales-And-Dolphins-A3-Document.pdf), Sea Wise Code advised by NRW (https://naturalresources.wales/media/3513/sea-wise-code.pdf), South and West Wales seabird and seal code of conduct (https://www.welshwildlife.org/nature-reserves/code-conduct-seabirds-and-seals).

effects to these wide-ranging fish species to result from the CWP Project in combination with other offshore projects, including OWF projects on the east coast of Ireland, including Arklow Bank, Dublin Array and NISA. The EIAR concluded that impacts such as temporary habitat loss or disturbance, long-term habitat loss and increased suspended sediments concentrations are expected to occur over a spatial extent which is very small relative to the wider area over which developments occur, and relative to the size of available spawning and nursery areas for fish. Therefore, these impacts are considered negligible in the context of the wider availability of suitable habitat for harbour porpoise prey species. In summary, the cumulative assessment for fish and shellfish does not identify any significant cumulative effects resulting from the CWP Project alongside other projects.

Impact 4: Changes in available habitat

155. The Conservation Objective of relevance is to ensure *"the condition of supporting habitats and processes […] is maintained. Supporting habitats, in this context, means the characteristics of the seabed and water column. Processes encompass the movements and physical properties of the habitat".*

156. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives for harbour porpoise associated with the North Anglesey Marine SAC from changes in available supporting habitat, and no AESI overall.

Assessment of the Project In-Combination

157. To inform this NIS assessment, the assessment of potential cumulative effects on Marine Geology, Sediments and Coastal Processes carried out as a part of the EIAR (**Appendix 6.1 Marine Geology, Sediments and Coastal Processes Cumulative Effects Assessment**) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to the SAC, it does assess the broader potential for cumulative effects to result from CWP in combination with other offshore projects, including Dublin Array OWF, Arklow Bank Phase 2 OWF, Dublin Port MP2 project, Dublin Port maintenance dredging and Dublin Port capital dredging. No significant cumulative effects of suspended sediment concentration, sediment deposition, alteration in seabed morphology or changes to the hydrodynamic, wave and sediment regimes or coastal processes were identified. Therefore, it is assumed that there will be no significant impact to the marine geology, sediments and coastal processes within the North Anglesey Marine SAC.

158. Additionally, to inform this NIS assessment, the assessment of potential cumulative effects on marine water quality carried out as a part of the EIAR (**Appendix 7.1 Marine water Quality Cumulative Effects Assessment**) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to the SAC, it does assess the broader potential for cumulative effects to result from CWP in combination with other offshore projects, including Arklow Bank Phase 2 OWF, Banba Wind OWF, Setanta Wind Park, Dublin Array OWF, Dublin Port dredging, Dublin Port MP2, Kilmichael Point Wind, Lir Offshore Array, Drogheda Port dredging, Mares Connect, NISA OWF etc. It was assumed that impacts at other offshore projects would be relatively similar to those at the CWP Project, and thus none of the impacts (increases in suspended sediment, resuspension of contaminated sediments or accidental pollution) across the cumulative projects resulted in a significant effect on marine water quality. Therefore, it is assumed that there will be no significant impact to the marine water quality within the North Anglesey Marine SAC.

159. In summary, there is not expected to be any significant effect to the supporting habitats within the North Anglesey Marine SAC from the CWP Project in combination with other projects.

3.7 Blackwater Bank SAC (IE002953)

3.7.1 Harbour porpoise

Table 3-17 Conservation objectives for the Blackwater Bank SAC and summary of associated assessment of the CWP Project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
Range: Species range within the site should not be restricted by artificial barriers to site use. **Population:** Human activities should occur at levels that do not adversely affect the harbour porpoise population at the site.	Increased underwater noise:			Adverse effects on the qualifying Annex II feature (harbour porpoise) of the Blackwater Bank SAC will not occur as a result of impacts associated with the CWP Project in-combination with other projects.
	The CWP Project has committed to implementing both a UXO MMMP and a piling MMMP. Increased underwater noise from the CWP Project in combination with other projects is not expected to result in the permanent exclusion of harbour porpoise from part of its range within the site and will not permanently prevent access for the species to suitable habitat.	No additional mitigation is required.	There is no potential for an AEoI associated with maintaining the species (harbour porpoise) range due to increased underwater noise from the CWP Project in-combination with other projects.	
	Collision risk:			
	The CWP Project has committed to implementing an EVMP. Other projects are anticipated to comply with Marine Wildlife Watching Codes. Collision risk from CWP Project	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of collision risk from the	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	in-combination with other projects is not expected to: - result in the permanent exclusion of harbour porpoise from part of its range within the site and permanently prevent access for the species to suitable habitat; and - adversely affect the harbour porpoise population at the site.		CWP Project in-combination with other projects.	
	Changes in prey availability:			
	Changes in prey availability from the CWP Project in-combination with other projects will not cause barriers to site use and are not expected to adversely affect the harbour porpoise population at the site.	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the site from changes in prey availability from the CWP Project in-combination with other projects.	
	Changes in available habitat:			
	Changes in available habitat from the CWP Project in-combination with other projects are not expected to: - result in the permanent exclusion of harbour porpoise from part of its	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the site from changes in available habitat from the CWP Project in-combination with other projects.	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	range within the site and permanently prevent access for the species to suitable habitat; and - adversely affect the harbour porpoise population at the site.			

Increased underwater noise

160. Target 2 of the Conservation Objectives states that *"proposed activities or operations should not introduce man-made energy (e.g. aerial or underwater noise, light or thermal energy) at levels that could result in a significant negative impact on individuals and / or the population of harbour porpoise within the site"*.

161. The Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with the Blackwater Bank SAC from increased underwater noise, either ex situ or in situ.

Assessment of the Project In-Combination

162. This assessment focuses on the potential in-combination impact of construction activities at other offshore projects in the Celtic and Irish Sea MU for porpoise in 2027 (the same year as piling at the CWP project). As outlined in **EIAR Chapter 11, Appendix 11.1 Cumulative effects assessment for marine mammals**, there are expected to be seven other OWFs in the Celtic and Irish Sea MU that will be constructing in 2027 as well as two tidal projects, three coastal projects and one cable project (**Table 3-18**). As such, these offshore projects have been screened into the in-combination assessment for disturbance from underwater noise for harbour porpoise.

Table 3-18 Offshore projects constructing in the Celtic and Irish Sea MU in 2027

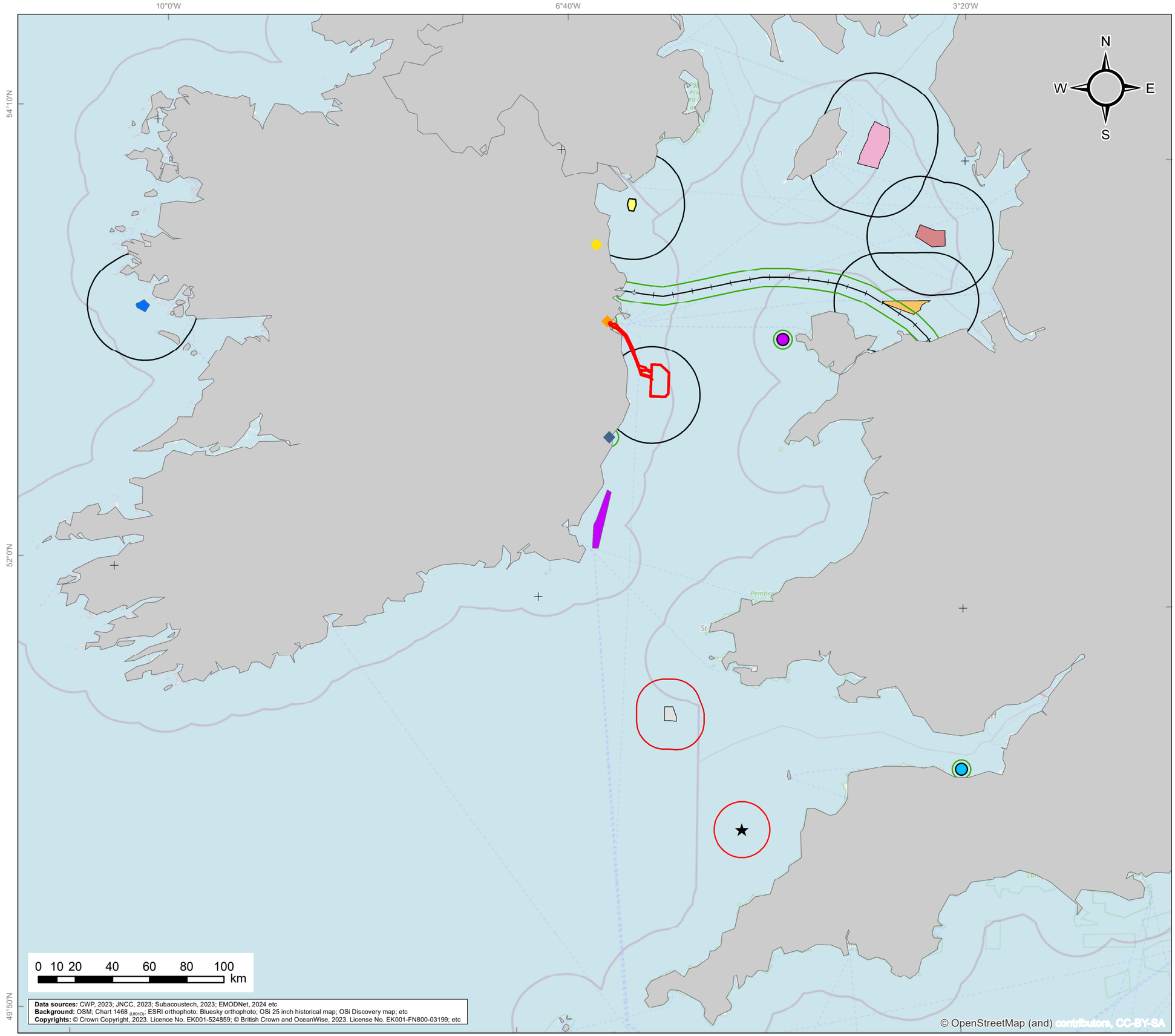
Project	Tier	Type
Codling	-	OWF
Awel y Môr	1	OWF
Erebus Floating Wind Demo	1	Floating
White Cross	1	Floating
West Somerset Tidal Lagoon	1	Tidal
Arklow Waste Water Treatment	1	Coastal
Maintenance dredging River Boyne, Drogheda	1	Coastal
North Wall Emergency Power Generation Plant	1	Coastal
Oriel	2b	OWF
Sceirde Rocks	2a	OWF
Morecambe	2b	OWF
Isle of Man	2b	OWF
Mares Connect	3	Cable
Holyhead Deep	3	Tidal

163. To quantitatively assess the potential for disturbance to the SAC for each of the projects in-combination, a 26 km (fixed) or 15 km (floating (i.e., anchor pile installation) and / or jacket (pin) pile installation) EDR was assumed as an indicative disturbance area for each OWF project (this follows

the guidance in JNCC (2020) for disturbance assessments to porpoise SACs in England, Wales and Northern Ireland where 26 km EDR is advised for monopiles and 15 km EDR is advised for pin-piles). Additionally, it was assumed that coastal, tidal and cable projects require no piling activities and thus disturbance effects during construction are expected to be limited to activities such as dredging, trenching, cable laying, vessel activity etc for which a maximum 5 km EDR has been assumed (as per (McQueen et al., 2020) for dredging activities).

164. With regards in situ effects the CWP project was the only project to have disturbance contours that overlapped with the boundary of the Blackwater Bank SAC (see **Figure 3-5**). With regards ex situ effects, the level of disturbance predicted to occur within the Celtic and Irish Sea MU between 2023 and 2028, and in particular in 2027, 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. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the SAC from an increase in underwater noise from construction activities from CWP Project in-combination with other projects, either ex situ or in situ.

165. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the SAC from an increase in underwater noise from construction activities from CWP Project in-combination with other projects, and no AESI overall.



Legend

- Planning application boundary
- 5 km EDR
- 15 km EDR
- 26 km EDR
- North Wall Power Plant
- Arklow Waste Treatment Plant
- Dogheda Maintenance Dredge
- West Somerset Lagoon Tidal
- Holyhead Deep Tidal
- Mares Connect
- Whitecross
- Sceirde Rocks
- Oriel
- Awel y Mor
- Isle of Man
- Morcambe
- Erebus (Floating)
- Blackwater Bank SAC

codling wind park

Project: Codling Wind Park

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Figure 3.5:
26 km EDR for piling in combination with the 5 km, 15 km and 26 km EDR from other construction projects, in relation to the Blackwater Bank SAC designated for harbour porpoise

CWP doc. number: CWP-SMR-ENG-08-01-MAP-1673

Internal descriptive code:
IRE - PAB..DPNM.THRESH.SEDR.15EDR.26EDR.CONT - ARK.WASTE.TP..AWEL..DOGHEDA.MAIN.DREDGE..EREBUS..HOLY.DEEP.TIDAL..ISLE OF MAN..MARES.CONNECT..MORCAMBE..NORTH.WALL.PP..ORIEL..SCEIRDE.ROCKS..WEST.SOMER.LAG.TIDAL..WHITECROSS..BLACKWATER.BANK.SAC - (WS Vol.06.a.Sec.03.FIG.06)

Size: A3
Scale: 1:2,000,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
A	Final version	2024/07/17	JC	RRS/EA	JM

Vessel collision

166. Target 2 of the Conservation Objectives states that *"proposed activities or operations should not cause death or injury to individuals to an extent that may ultimately affect the harbour porpoise population at the site"*.

167. The Project alone assessment concluded that, giving consideration to primary mitigation measures, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from collision risk, either ex situ or in situ.

Assessment of the Project In-Combination

168. The risk of collision to marine mammals is expected to be primarily localised to within the boundaries of the respective projects. None of the project boundaries overlap with the Blackwater Bank SAC. The vessel routes and potential ports used by other offshore projects are unknown, and therefore it is not possible to estimate the expected level of vessel activity within the Blackwater Bank SAC from other projects. However, it is assumed that all other offshore projects in the Celtic and Irish Sea MU will either adopt a VMP or follow best practice codes of conduct on vessel handing around marine mammals to minimise any potential effects on marine mammals and reduce risk of collision. As such, the potential for collision risk from CWP Project in-combination with other projects is considered negligible.

169. No harbour porpoise within the SAC are expected to experience death or injury from vessel collisions and as such, risk of collision will not adversely affect the harbour porpoise community at the site. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from collision risk from the CWP Project in-combination with other projects, and no AESI overall.

Changes in prey availability

170. Target 2 of the Conservation Objectives states that "*Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site. This target also relates to proposed activities or operations that may result in the deterioration of key resources (e.g. water quality, feeding, etc.) upon which harbour porpoise depend*".

171. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with the Blackwater Bank SAC from changes in prey availability, either ex situ or in situ.

Assessment of the Project In-Combination

172. Where multiple projects may impact upon harbour porpoise fish prey species or the habitats that support the prey within the site, there is the potential for in-combination indirect effects on the harbour porpoise community. Therefore, projects with the potential to act in-combination with CWP are those where the spatial footprint of activities (e.g., underwater noise, seabed disturbance) may encroach upon the SAC.

173. To inform this NIS, **Chapter 9 Fish, Shellfish and Turtle Ecology** of the EIAR prepared for the Project was referred to. The EIAR concludes that there will be no significant impact to any fish species from any impact pathway during the construction, operation or decommissioning of the CWP Project alone

(this includes direct damage, disturbance, increased suspended sediment concentration (SSC) and sediment deposition, release of seabed contaminants, underwater noise etc).

174. Considering the conclusions for the Project Alone assessment, the potential for CWP to provide a non-negligible contribution to in-combination effects on prey availability alongside other projects is considered to be remote. To inform this NIS assessment, the assessment of potential cumulative effects on fish and shellfish receptors carried out as a part of the EIAR (**Chapter 9 Fish, Shellfish and Turtle Ecology**) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to harbour porpoise prey species within the SAC, it does assess the broader potential for cumulative effects to these wide-ranging fish species to result from CWP in combination with relevant projects, including OWF projects on the east coast of Ireland, including Arklow Bank, Dublin Array and NISA. The EIAR concluded that impacts such as temporary habitat loss or disturbance, long-term habitat loss and increased suspended sediments concentrations are expected to occur over a spatial extent which is very small relative to the wider area over which developments occur, and relative to the size of available spawning and nursery areas for fish. Therefore, these impacts are considered negligible in the context of the wider availability of suitable habitat for marine mammal prey species. In summary, the cumulative assessment for fish and shellfish does not identify any significant cumulative effects resulting from the CWP Project alongside other projects. As such, it is anticipated that during the construction phase and any maintenance / decommissioning activities at CWP and other projects, any impacts to harbour porpoise prey availability will be negligible.

175. Considering the above, there is expected to be no long-term change to harbour porpoise prey species presence, abundance, condition or diversity; as such, there will be no deterioration of key resources (feeding) upon which harbour porpoises depend. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise community from changes in prey availability from the CWP Project in-combination with other projects, and no AESI overall.

Changes in available habitat

176. Target 1 of the Conservation Objectives states that *"Species range within the site should not be restricted by artificial barriers to site use. This target may be considered relevant to proposed activities or operations that will result in the permanent exclusion of harbour porpoise from part of its range within the site or will permanently prevent access for the species to suitable habitat therein"*.

177. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with Blackwater Bank SAC from changes in available habitat, either ex situ or in situ.

Assessment of the Project In-Combination

178. While offshore projects within the Celtic and Irish Sea MU have the potential to cause disturbance impacts to harbour porpoise, like CWP Project alone, the behavioural effects will be short-lived, and animals are expected to return to baseline activities following the cessation of activities. As such, no activities at any project are expected to result in the permanent exclusion of harbour porpoise from part of their range within the Blackwater Bank SAC.

179. Considering the above, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from changes in available habitat from the CWP Project in-combination with other projects, and no AESI overall.

3.8 Blasket Islands SAC (IE002172)

3.8.1 Harbour porpoise

Table 3-19 Conservation objectives for the Blasket Islands SAC and summary of associated assessment of the CWP Project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
Range: Species range within the site should not be restricted by artificial barriers to site use. **Population:** Human activities should occur at levels that do not adversely affect the harbour porpoise population at the site.	Increased underwater noise:			Adverse effects on the qualifying Annex II feature (harbour porpoise) of the Blasket Islands SAC will not occur as a result of impacts associated with the CWP Project in-combination with other projects.
	The CWP Project has committed to implementing both a UXO MMMP and a piling MMMP. Increased underwater noise from the CWP Project in combination with other projects is not expected to result in the permanent exclusion of harbour porpoise from part of its range within the site and will not permanently prevent access for the species to suitable habitat.	No additional mitigation is required.	There is no potential for an AEoI associated with maintaining the species (harbour porpoise) range due to increased underwater noise from the CWP Project in-combination with other projects.	
	Collision risk:			
	The CWP Project has committed to implementing an EVMP. Other projects are anticipated to comply with Marine Wildlife Watching Codes. Collision risk from the CWP	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of collision risk from the	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	Project in-combination with other projects is not expected to: - result in the permanent exclusion of harbour porpoise from part of its range within the site and permanently prevent access for the species to suitable habitat; and - adversely affect the harbour porpoise population at the site.		CWP Project in-combination with other projects.	
	Changes in prey availability:			
	Changes in prey availability from the CWP Project in-combination with other projects will not cause barriers to site use and are not expected to adversely affect the harbour porpoise population at the site.	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the site from changes in prey availability from the CWP Project in-combination with other projects.	
	Changes in available habitat:			
	Changes in available habitat from CWP Project in-combination with other projects are not expected to: - result in the permanent exclusion of harbour porpoise from part of its	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the site from changes in available habitat from the CWP Project in-combination with other projects.	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	range within the site and permanently prevent access for the species to suitable habitat; and - adversely affect the harbour porpoise population at the site.			

Increased underwater noise

180. Target 2 of the Conservation Objectives states that *"proposed activities or operations should not introduce man-made energy (e.g. aerial or underwater noise, light or thermal energy) at levels that could result in a significant negative impact on individuals and / or the population of harbour porpoise within the site"*.

181. The Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with the Blasket Islands SAC from increased underwater noise, either ex situ or in situ.

Assessment of the Project In-Combination

182. This assessment focuses on the potential in-combination impact of construction activities at other offshore projects in the Celtic and Irish Sea MU for porpoise in 2027 (the same year as piling at the CWP project). As outlined in **EIAR Chapter 11, Appendix 11.1 Cumulative effects assessment for marine mammals**, there are expected to be seven other OWFs in the Celtic and Irish Sea MU that will be constructing in 2027 as well as two tidal projects, three coastal projects and one cable project (**Table 3-20**). As such, these offshore projects have been screened into the in-combination assessment for disturbance from underwater noise for harbour porpoise.

Table 3-20 Offshore projects constructing in the Celtic and Irish Sea MU in 2027

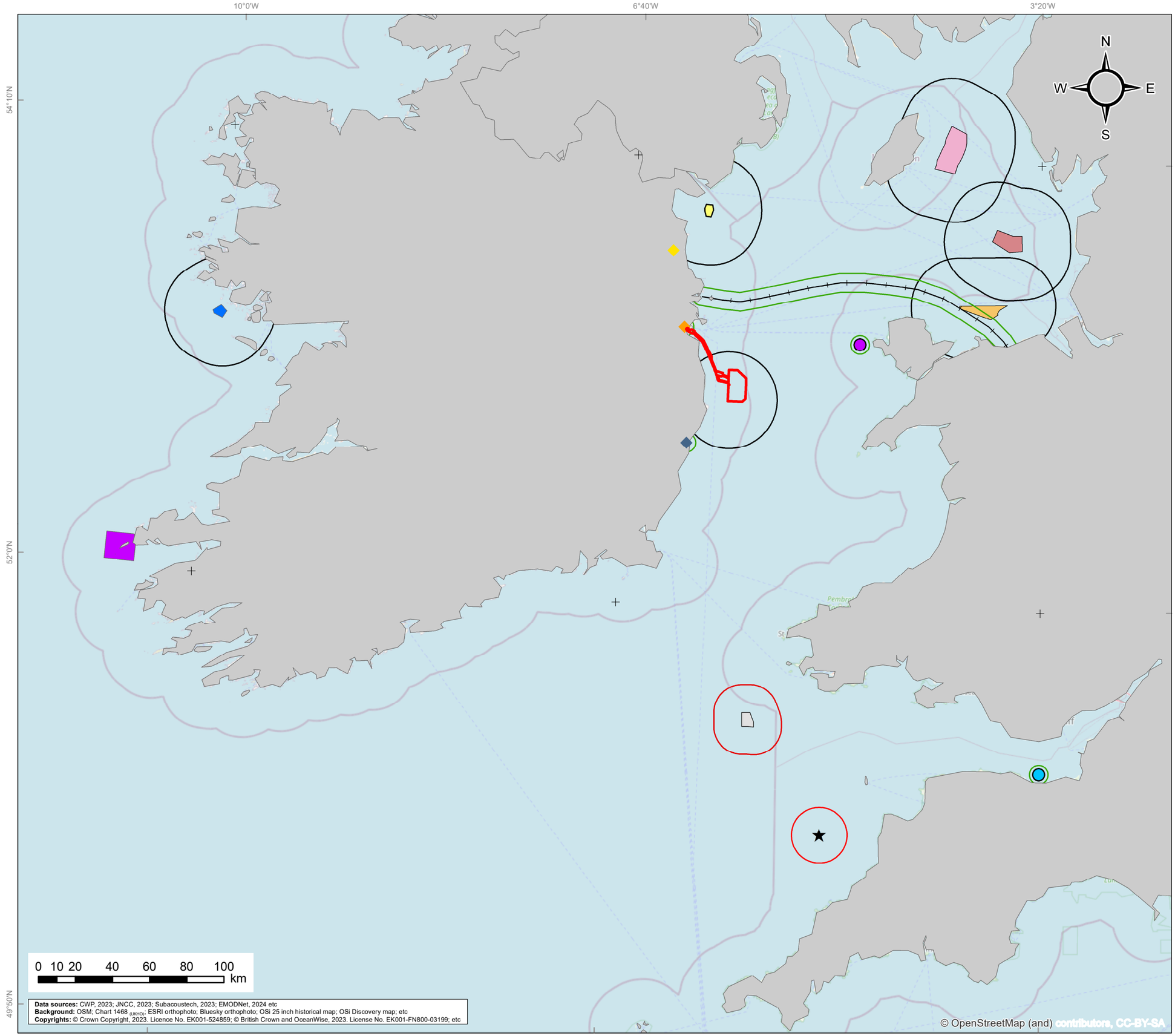
Project	Tier	Type
Codling	-	OWF
Awel y Môr	1	OWF
Erebus Floating Wind Demo	1	Floating
White Cross	1	Floating
West Somerset Tidal Lagoon	1	Tidal
Arklow Waste Water Treatment	1	Coastal
Maintenance dredging River Boyne, Drogheda	1	Coastal
North Wall Emergency Power Generation Plant	1	Coastal
Oriel	2b	OWF
Sceirde Rocks	2a	OWF
Morecambe	2b	OWF
Isle of Man	2b	OWF
Mares Connect	3	Cable
Holyhead Deep	3	Tidal

183. To quantitatively assess the potential for disturbance to the SAC for each of the projects in-combination, a 26 km (fixed) or 15 km (floating (i.e., anchor pile installation) and / or jacket (pin) pile installation) EDR was assumed as an indicative disturbance area for each OWF project (this follows the guidance in JNCC (2020) for disturbance assessments to porpoise SACs in England, Wales and

Northern Ireland where 26 km EDR is advised for monopiles and 15 km EDR is advised for pin-piles). Additionally, it was assumed that coastal, tidal and cable projects require no piling activities and thus disturbance effects during construction are expected to be limited to activities such as dredging, trenching, cable laying, vessel activity etc for which a maximum 5 km EDR has been assumed (as per (McQueen et al., 2020) for dredging activities).

184. With regards to in situ effects, none of the projects have disturbance impact ranges that overlap with the Blasket Islands SAC (**Figure 3-6**). With regards ex situ effects, the level of disturbance predicted to occur within the Celtic and Irish Sea MU between 2023 and 2028, and in particular in 2027, 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. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the SAC from an increase in underwater noise from construction activities from CWP Project in-combination with other projects, either ex situ or in situ.

185. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from disturbance from underwater noise from the CWP Project in-combination with other projects, and no AESI overall.



Legend

- Planning application boundary
- 5 km EDR
- 15 km EDR
- 26 km EDR
- North Wall Power Plant
- Arklow Waste Treatment Plant
- Dogheda Maintenance Dredge
- West Somerset Lagoon Tidal
- Holyhead Deep Tidal
- Mares Connect
- Whitecross
- Sceirde Rocks
- Oriel
- Awel y Mor
- Isle of Man
- Morcambe
- Erebus (Floating)
- Blasket Islands SAC

codling wind park

Project: Codling Wind Park

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Figure 3.6:
26 km EDR for piling in combination with the 5 km, 15 km and 26 km EDR from other construction projects, in relation to the Blasket Islands SAC designated for harbour porpoise

CWP doc. number: CWP-SMR-ENG-08-01-MAP-1674

Internal descriptive code: IRE - PAB..DPWM..THRESH..5EDR.15EDR.26EDR.CONT. - ARK.WASTE.TP..AWEL..DOGHEDA.MAIN.DREDGE..EREBUS..HOLY.DEEP.TIDAL..ISLE.OF.MAN..MARES .CONNECT..MORCAMBE..NORTH.WALL.PP..ORIEL..SCEIRDE.ROCKS.. WEST.SOMER.LAG.TIDAL..WHITECROSS..BLASKET.ISL.SAC - (NIS.Vol.06.a.Sec.03.FIG.07)

Size: A3
Scale: 1:2,000,000

CRS: EPSG 25830

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
A	Final version	2024/07/17	JC	RRS/EA	JM

Vessel collision

186. Target 2 of the Conservation Objectives states that *"proposed activities or operations should not cause death or injury to individuals to an extent that may ultimately affect the harbour porpoise population at the site"*.

187. The Project alone assessment concluded that, giving consideration to primary mitigation measures, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from collision risk, either ex situ or in situ.

Assessment of the Project In-Combination

188. The risk of collision to marine mammals is expected to be primarily localised to within the boundaries of the respective projects. None of the project boundaries overlap with the Blasket Island SAC. The vessel routes and potential ports used by other offshore projects are unknown, and therefore it is not possible to estimate the expected level of vessel activity within the Blasket Islands SAC from other projects. However, it is assumed that all other offshore projects in the Celtic and Irish Sea MU will either adopt a VMP or follow best practice codes of conduct on vessel handing around marine mammals[13] to minimise any potential effects on marine mammals and reduce risk of collision. As such, the potential for collision risk from CWP Project in-combination with other projects is considered negligible.

189. No harbour porpoise within the SAC are expected to experience death or injury from vessel collisions and as such, risk of collision will not adversely affect the harbour porpoise community at the site. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from collision risk from the CWP Project in-combination with other projects, and no AESI overall.

Changes in prey availability

190. Target 2 of the Conservation Objectives states that "*Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site. This target also relates to proposed activities or operations that may result in the deterioration of key resources (e.g. water quality, feeding, etc.) upon which harbour porpoise depend*".

191. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with the Blasket Islands SAC from changes in prey availability, either ex situ or in situ.

Assessment of the Project In-Combination

192. Where multiple projects may impact upon harbour porpoise fish prey species or the habitats that support the prey within the site, there is the potential for in-combination indirect effects on the harbour porpoise community. Therefore, projects with the potential to act in-combination with CWP are those where the spatial footprint of activities (e.g., underwater noise, seabed disturbance) may encroach upon the SAC.

[13] E.g. IWDG code of conduct (https://iwdg.ie/cms_files/wp-content/uploads/2022/06/Code-of-Conduct-When-Encountering-Whales-And-Dolphins-A3-Document.pdf), Sea Wise Code advised by NRW (https://naturalresources.wales/media/3513/sea-wise-code.pdf), South and West Wales seabird and seal code of conduct (https://www.welshwildlife.org/nature-reserves/code-conduct-seabirds-and-seals).

193. To inform this NIS, **Chapter 9 Fish, Shellfish and Turtle Ecology** of the EIAR prepared for the Project was referred to. The EIAR concludes that there will be no significant impact to any fish species from any impact pathway during the construction, operation or decommissioning of the CWP Project alone (this includes direct damage, disturbance, increased suspended sediment concentration (SSC) and sediment deposition, release of seabed contaminants, underwater noise etc).

194. Considering the conclusions for the Project Alone assessment, the potential for CWP to provide a non-negligible contribution to in-combination effects on prey availability alongside other projects is considered to be remote. To inform this NIS assessment, the assessment of potential cumulative effects on fish and shellfish receptors carried out as a part of the EIAR (**Chapter 9 Fish, Shellfish and Turtle Ecology**) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to harbour porpoise prey species within the SAC, it does assess the broader potential for cumulative effects to these wide-ranging fish species to result from CWP in combination with relevant projects, including OWF projects on the east coast of Ireland, including Arklow Bank, Dublin Array and NISA. The EIAR concluded that impacts such as temporary habitat loss or disturbance, long-term habitat loss and increased suspended sediments concentrations are expected to occur over a spatial extent which is very small relative to the wider area over which developments occur, and relative to the size of available spawning and nursery areas for fish. Therefore, these impacts are considered negligible in the context of the wider availability of suitable habitat for marine mammal prey species. In summary, the cumulative assessment for fish and shellfish does not identify any significant cumulative effects resulting from the CWP Project alongside other projects. As such, it is anticipated that during the construction phase and any maintenance / decommissioning activities at CWP and other projects, any impacts to harbour porpoise prey availability will be negligible.

195. Considering the above, there is expected to be no long-term change to harbour porpoise prey species presence, abundance, condition or diversity; as such, there will be no deterioration of key resources (feeding) upon which harbour porpoises depend. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise community from changes in prey availability from the CWP Project in-combination with other projects, and no AESI overall.

Changes in available habitat

196. Target 1 of the Conservation Objectives states that *"Species range within the site should not be restricted by artificial barriers to site use. This target may be considered relevant to proposed activities or operations that will result in the permanent exclusion of harbour porpoise from part of its range within the site or will permanently prevent access for the species to suitable habitat therein"*.

197. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with Blasket Islands SAC from changes in available habitat, either ex situ or in situ.

Assessment of the Project In-Combination

198. While offshore projects within the Celtic and Irish Sea MU have the potential to cause disturbance impacts to harbour porpoise, like the CWP Project alone, the behavioural effects will be short-lived, and animals are expected to return to baseline activities following the cessation of activities. As such, no activities of any project are expected to result in the permanent exclusion of harbour porpoise from part of their range within the Blasket Islands SAC.

199. Considering the above, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from changes in available habitat from the CWP Project in-combination with other projects, and no AESI overall.

3.9 Carnsore Point SAC (IE002269)

3.9.1 Harbour porpoise

Table 3-21 Conservation objectives for the Carnsore Point SAC and summary of associated assessment of the CWP Project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
Range: Species range within the site should not be restricted by artificial barriers to site use. **Population:** Human activities should occur at levels that do not adversely affect the harbour porpoise population at the site.	Increased underwater noise:			Adverse effects on the qualifying Annex II feature (harbour porpoise) of the Carnsore Point SAC will not occur as a result of impacts associated with the CWP Project in-combination with other projects.
	The CWP Project has committed to implementing both a UXO MMMP and a piling MMMP. Increased underwater noise from the CWP Project in combination with other projects is not expected to result in the permanent exclusion of harbour porpoise from part of its range within the site and will not permanently prevent access for the species to suitable habitat.	No additional mitigation is required.	There is no potential for an AEoI associated with maintaining the species (harbour porpoise) range due to increased underwater noise from the CWP Project in-combination with other projects.	
	Collision risk:			
	The CWP Project has committed to implementing an EVMP. Other projects are anticipated to comply with Marine Wildlife Watching Codes. Collision risk from the CWP	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of collision risk from the	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	Project in-combination with other projects is not expected to: - result in the permanent exclusion of harbour porpoise from part of its range within the site and permanently prevent access for the species to suitable habitat; and - adversely affect the harbour porpoise population at the site.		CWP Project in-combination with other projects.	
	Changes in prey availability:			
	Changes in prey availability from the CWP Project in-combination with other projects will not cause barriers to site use and are not expected to adversely affect the harbour porpoise population at the site.	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the site from changes in prey availability from the CWP Project in-combination with other projects.	
	Changes in available habitat:			
	Changes in available habitat from CWP Project in-combination with other projects are not expected to: - result in the permanent exclusion of harbour porpoise from part of its	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the site from changes in available habitat from the CWP Project in-combination with other projects.	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	range within the site and permanently prevent access for the species to suitable habitat; and - adversely affect the harbour porpoise population at the site.			

Increased underwater noise

200. Target 2 of the Conservation Objectives states that *"proposed activities or operations should not introduce man-made energy (e.g. aerial or underwater noise, light or thermal energy) at levels that could result in a significant negative impact on individuals and / or the population of harbour porpoise within the site"*.

201. The Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with the Carnsore Point SAC from increased underwater noise, either ex situ or in situ.

Assessment of the Project In-Combination

202. This assessment focuses on the potential in-combination impact of construction activities at other offshore projects in the Celtic and Irish Sea MU for porpoise in 2027 (the same year as piling at the CWP project). As outlined in **EIAR Chapter 11, Appendix 11.1 Cumulative effects assessment for marine mammals**, there are expected to be seven other OWFs in the Celtic and Irish Sea MU that will be constructing in 2027 as well as two tidal projects, three coastal projects and one cable project (**Table 3-22**). As such, these offshore projects have been screened into the in-combination assessment for disturbance from underwater noise for harbour porpoise.

Table 3-22 Offshore projects constructing in the Celtic and Irish Sea MU in 2027

Project	Tier	Type
Codling	-	OWF
Awel y Môr	1	OWF
Erebus Floating Wind Demo	1	Floating
White Cross	1	Floating
West Somerset Tidal Lagoon	1	Tidal
Arklow Waste Water Treatment	1	Coastal
Maintenance dredging River Boyne, Drogheda	1	Coastal
North Wall Emergency Power Generation Plant	1	Coastal
Oriel	2b	OWF
Sceirde Rocks	2a	OWF
Morecambe	2b	OWF
Isle of Man	2b	OWF
Mares Connect	3	Cable
Holyhead Deep	3	Tidal

203. To quantitatively assess the potential for disturbance to the SAC for each of the projects in-combination, a 26 km (fixed) or 15 km (floating (i.e., anchor pile installation) and / or jacket (pin) pile installation) EDR was assumed as an indicative disturbance area for each OWF project (this follows the guidance in JNCC (2020) for disturbance assessments to porpoise SACs in England, Wales and

Northern Ireland where 26 km EDR is advised for monopiles and 15 km EDR is advised for pin-piles). Additionally, it was assumed that coastal, tidal and cable projects require no piling activities and thus disturbance effects during construction are expected to be limited to activities such as dredging, trenching, cable laying, vessel activity etc for which a maximum 5 km EDR has been assumed (as per (McQueen et al., 2020) for dredging activities).

204. With regards in situ effects none of the projects have disturbance contours that overlapped with the boundary of the Carnsore Point SAC; as such, there is no in-combination effect of disturbance to porpoise within the site (**Figure 3-7**). With regards ex situ effects, the level of disturbance predicted to occur within the Celtic and Irish Sea MU between 2023 and 2028, and in particular in 2027, 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. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the SAC from an increase in underwater noise from construction activities from CWP Project in-combination with other projects, either ex situ or in situ.

205. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the SAC from an increase in underwater noise from construction activities from CWP Project in-combination with other projects, and no AESI overall.

10°0'W
6°40'W
3°20'W
54°10'N
52°0'N
49°50'N

N
W
E
S

0 10 20 40 60 80 100 km

Data sources: CWP, 2023; JNCC, 2023; Subacoustech, 2023; EMODNet, 2024 etc
Background: OSM; Chart 1468 (UKHO); ESRI orthophoto; Bluesky orthophoto; OSi 25 inch historical map; OSi Discovery map; etc
Copyrights: © Crown Copyright, 2023. Licence No. EK001-524859; © British Crown and OceanWise, 2023. License No. EK001-FN800-03199; etc

Legend

- Planning application boundary
- 5 km EDR
- 15 km EDR
- 26 km EDR
- North Wall Power Plant
- Arklow Waste Treatment Plant
- Dogheda Maintenance Dredge
- West Somerset Lagoon Tidal
- Holyhead Deep Tidal
- Mares Connect
- Whitecross
- Sceirde Rocks
- Oriel
- Awel y Mor
- Isle of Man
- Morcambe
- Erebus (Floating)
- Carnsore Point SAC

codling wind park

Project: Codling Wind Park

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understand • assess • mitigate

Figure 3.07:
26 km EDR for piling in combination with the 5 km, 15 km and 26 km EDR from other construction projects, in relation to the Carnsore Point SAC designated for harbour porpoise

CWP doc. number: CWP-SMR-ENG-08-01-MAP-1675

Internal descriptive code:
IRE - PAB..DPNM.THRESH.SEDR.15EDR.26EDR.CONT - ARK.WASTE.TP..AWEL..DOGHEDA MAIN.DREDGE..EREBUS..HOLY.DEEPTIDAL..ISLE.OF.MAN..MARES.CONNECT..MORCAMBE..NORTH.WALL.PP..ORIEL..SCEIRDE.ROCKS..WEST.SOMER.LAG.TIDAL..WHITECROSS..CARNSORE.POINT.SAC - (NIS.Vol.06.a.Sec.03.FIG.08)

Size: A3
Scale: 1:2,000,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
A	Final version	2024/07/17	JC	RRS/EA	JM

Vessel collision

206. Target 2 of the Conservation Objectives states that *"proposed activities or operations should not cause death or injury to individuals to an extent that may ultimately affect the harbour porpoise population at the site"*.

207. The Project alone assessment concluded that, giving consideration to primary mitigation measures, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from collision risk, either ex situ or in situ.

Assessment of the Project In-Combination

208. The risk of collision to marine mammals is expected to be primarily localised to within the boundaries of the respective projects. None of the project boundaries overlap with the Carnsore Point SAC. The vessel routes and potential ports used by other offshore projects are unknown, and therefore it is not possible to estimate the expected level of vessel activity within the Carnsore Point SAC. However, it is assumed that all other offshore projects in the Celtic and Irish Sea MU will either adopt a VMP or follow best practice codes of conduct on vessel handing around marine mammals[14] to minimise any potential effects on marine mammals and reduce risk of collision. As such, the potential for collision risk from CWP Project in-combination with other projects is considered negligible.

209. No harbour porpoise within the SAC are expected to experience death or injury from vessel collisions and as such, risk of collision will not adversely affect the harbour porpoise community at the site. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from collision risk from the CWP Project in-combination with other projects, and no AESI overall.

Changes in prey availability

210. Target 2 of the Conservation Objectives states that "*Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site. This target also relates to proposed activities or operations that may result in the deterioration of key resources (e.g. water quality, feeding, etc.) upon which harbour porpoise depend*".

211. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with the Carnsore Point SAC from changes in prey availability, either ex situ or in situ.

Assessment of the Project In-Combination

212. Where multiple projects may impact upon harbour porpoise fish prey species or the habitats that support the prey within the site, there is the potential for in-combination indirect effects on the harbour porpoise community. Therefore, projects with the potential to act in-combination with CWP are those where the spatial footprint of activities (e.g., underwater noise, seabed disturbance) may encroach upon the SAC.

[14] E.g. IWDG code of conduct (https://iwdg.ie/cms_files/wp-content/uploads/2022/06/Code-of-Conduct-When-Encountering-Whales-And-Dolphins-A3-Document.pdf), Sea Wise Code advised by NRW (https://naturalresources.wales/media/3513/sea-wise-code.pdf), South and West Wales seabird and seal code of conduct (https://www.welshwildlife.org/nature-reserves/code-conduct-seabirds-and-seals).

213. To inform this NIS, **Chapter 9 Fish, Shellfish and Turtle Ecology** of the EIAR prepared for the Project was referred to. The EIAR concludes that there will be no significant impact to any fish species from any impact pathway during the construction, operation or decommissioning of the CWP Project alone (this includes direct damage, disturbance, increased suspended sediment concentration (SSC) and sediment deposition, release of seabed contaminants, underwater noise etc.).

214. Considering the conclusions for the Project Alone assessment, the potential for CWP to provide a non-negligible contribution to in-combination effects on prey availability alongside other projects is considered to be remote. To inform this NIS assessment, the assessment of potential cumulative effects on fish and shellfish receptors carried out as a part of the EIAR (**Chapter 9 Fish, Shellfish and Turtle Ecology**) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to harbour porpoise prey species within the SAC, it does assess the broader potential for cumulative effects to these wide-ranging fish species to result from CWP in combination with relevant projects, including OWF projects on the east coast of Ireland, including Arklow Bank, Dublin Array and NISA. The EIAR concluded that impacts such as temporary habitat loss or disturbance, long-term habitat loss and increased suspended sediments concentrations are expected to occur over a spatial extent which is very small relative to the wider area over which developments occur, and relative to the size of available spawning and nursery areas for fish. Therefore, these impacts are considered negligible in the context of the wider availability of suitable habitat for marine mammal prey species. In summary, the cumulative assessment for fish and shellfish does not identify any significant cumulative effects resulting from the CWP Project alongside other projects. As such, it is anticipated that during the construction phase and any maintenance / decommissioning activities at CWP and other projects, any impacts to harbour porpoise prey availability will be negligible.

215. Considering the above, there is expected to be no long-term change to harbour porpoise prey species presence, abundance, condition or diversity; as such, there will be no deterioration of key resources (feeding) upon which harbour porpoises depend. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise community from changes in prey availability from the CWP Project in-combination with other projects, and no AESI overall.

Changes in available habitat

216. Target 1 of the Conservation Objectives states that *"Species range within the site should not be restricted by artificial barriers to site use. This target may be considered relevant to proposed activities or operations that will result in the permanent exclusion of harbour porpoise from part of its range within the site or will permanently prevent access for the species to suitable habitat therein"*.

217. To recap, the Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with Carnsore Point SAC from changes in available habitat, either ex situ or in situ.

Assessment of the Project In-Combination

218. While offshore projects within the Celtic and Irish Sea MU have the potential to cause disturbance impacts to harbour porpoise, like CWP Project alone, the behavioural effects will be short-lived, and animals are expected to return to baseline activities following the cessation of activities. As such, no activities at any project are expected to result in the permanent exclusion of harbour porpoise from part of their range within the Carnsore Point SAC.

219. Considering the above, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from changes in available habitat from the CWP Project in-combination with other projects, and no potential for AESI overall.

3.10 Hook Head SAC (IE000764)

3.10.1 Harbour porpoise

Table 3-23 Conservation objectives for the Hook Head SAC and summary of associated assessment of the CWP Project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
Range: Species range within the site should not be restricted by artificial barriers to site use. **Population:** Human activities should occur at levels that do not adversely affect the harbour porpoise population at the site.	Increased underwater noise:			Adverse effects on the qualifying Annex II feature (harbour porpoise) of the Hook Head SAC will not occur as a result of impacts associated with the CWP Project in-combination with other projects.
	The CWP Project has committed to implementing both a UXO MMMP and a piling MMMP. Increased underwater noise from the CWP Project in combination with other projects is not expected to result in the permanent exclusion of harbour porpoise from part of its range within the site and will not permanently prevent access for the species to suitable habitat.	No additional mitigation is required.	There is no potential for an AEoI associated with maintaining the species (harbour porpoise) range due to increased underwater noise from the CWP Project in-combination with other projects.	
	Collision risk:			
	The CWP Project has committed to implementing an EVMP. Other projects are anticipated to comply with Marine Wildlife Watching Codes. Collision risk from the CWP	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of collision risk from the	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	Project in-combination with other projects is not expected to: - result in the permanent exclusion of harbour porpoise from part of its range within the site and permanently prevent access for the species to suitable habitat; and - adversely affect the harbour porpoise population at the site.		CWP Project in-combination with other projects.	
	Changes in prey availability:			
	Changes in prey availability from the CWP Project in-combination with other projects will not cause barriers to site use and are not expected to adversely affect the harbour porpoise population at the site.	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the site from changes in prey availability from the CWP Project in-combination with other projects.	
	Changes in available habitat:			
	Changes in available habitat from CWP Project in-combination with other projects are not expected to: - result in the permanent exclusion of harbour porpoise from part of its	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the site from changes in available habitat from the CWP Project in-combination with other projects.	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	range within the site and permanently prevent access for the species to suitable habitat; and - adversely affect the harbour porpoise population at the site.			

Increased underwater noise

220. Target 2 of the Conservation Objectives states that *"proposed activities or operations should not introduce man-made energy (e.g. aerial or underwater noise, light or thermal energy) at levels that could result in a significant negative impact on individuals and / or the population of harbour porpoise within the site"*.

221. The Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with the Hook Head SAC from increased underwater noise, either ex situ or in situ.

Assessment of the Project In-Combination

222. This assessment focuses on the potential in-combination impact of construction activities at other offshore projects in the Celtic and Irish Sea MU for porpoise in 2027 (the same year as piling at the CWP project). As outlined in **EIAR Chapter 11, Appendix 11.1 Cumulative effects assessment for marine mammals**, there are expected to be seven other OWFs in the Celtic and Irish Sea MU that will be constructing in 2027 as well as two tidal projects, three coastal projects and one cable project (**Table 3-24**). As such, these offshore projects have been screened into the in-combination assessment for disturbance from underwater noise for harbour porpoise.

Table 3-24 Offshore projects constructing in the Celtic and Irish Sea MU in 2027

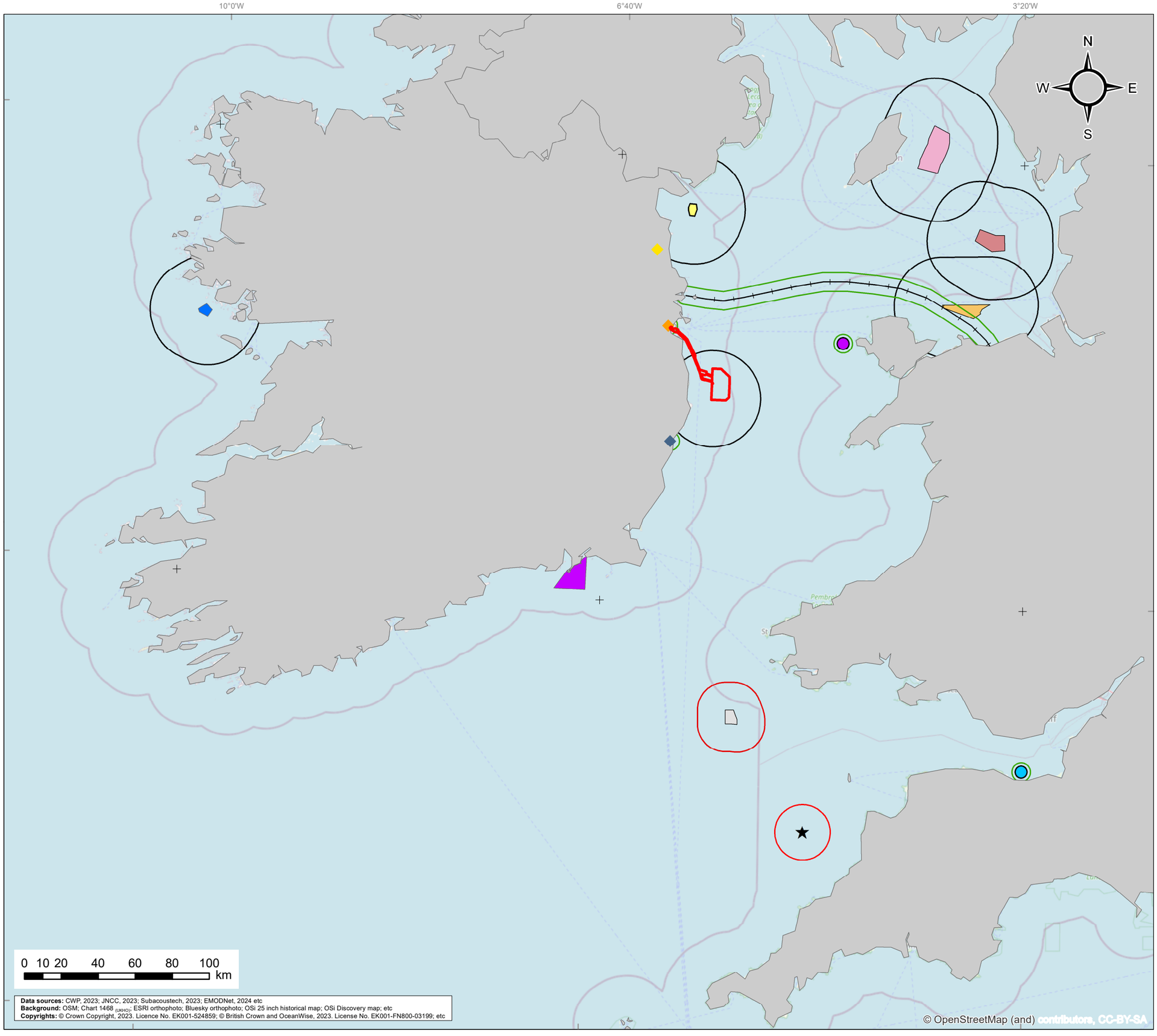
Project	Tier	Type
Codling	-	OWF
Awel y Môr	1	OWF
Erebus Floating Wind Demo	1	Floating
White Cross	1	Floating
West Somerset Tidal Lagoon	1	Tidal
Arklow Waste Water Treatment	1	Coastal
Maintenance dredging River Boyne, Drogheda	1	Coastal
North Wall Emergency Power Generation Plant	1	Coastal
Oriel	2b	OWF
Sceirde Rocks	2a	OWF
Morecambe	2b	OWF
Isle of Man	2b	OWF
Mares Connect	3	Cable
Holyhead Deep	3	Tidal

223. To quantitatively assess the potential for disturbance to the SAC for each of the projects in-combination, a 26 km (fixed) or 15 km (floating (i.e., anchor pile installation) and / or jacket (pin) pile installation) EDR was assumed as an indicative disturbance area for each OWF project (this follows the guidance in JNCC (2020) for disturbance assessments to porpoise SACs in England, Wales and

Northern Ireland where 26 km EDR is advised for monopiles and 15 km EDR is advised for pin-piles). Additionally, it was assumed that coastal, tidal and cable projects require no piling activities and thus disturbance effects during construction are expected to be limited to activities such as dredging, trenching, cable laying, vessel activity etc for which a maximum 5 km EDR has been assumed (as per (McQueen et al., 2020) for dredging activities).

224. With regards in situ effects none of the projects have disturbance impact ranges that overlap with the Hook Head SAC (**Figure 3-8**). With regards ex situ effects, the level of disturbance predicted to occur within the Celtic and Irish Sea MU between 2023 and 2028, and in particular in 2027, 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. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the SAC from an increase in underwater noise from construction activities from CWP Project in-combination with other projects, either ex situ or in situ.

225. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from disturbance from underwater noise from the CWP Project in-combination with other projects, and no potential for AESI overall.



Legend

- Planning application boundary
- 5 km EDR
- 15 km EDR
- 26 km EDR
- North Wall Power Plant
- Arklow Waste Treatment Plant
- Dogheda Maintenance Dredge
- West Somerset Lagoon Tidal
- Holyhead Deep Tidal
- Mares Connect
- Whitecross
- Sceirde Rocks
- Oriel
- Awel y Mor
- Isle of Man
- Morcambe
- Erebus (Floating)
- Hook Head SAC

codling wind park

Project: Codling Wind Park

SMRU Consulting
understand • assess • mitigate

Figure 3.8:
26 km EDR for piling in combination with the 5 km, 15 km and 26 km EDR from other construction projects, in relation to the Hook Head SAC designated for harbour porpoise

CWP doc. number: CWP-SMR-ENG-08-01-MAP-1678

Internal descriptive code:
IRE - PAB..DPNM.THRESH.SEDR.15EDR.26EDR.CONT - ARK.WASTE.TP..AWEL..DOGHEDA.MAIN.DREDGE..EREBUS..HOLYDEEPTIDAL..ISLE OF MAN..MARES..CONNECT..MORCAMBE..NORTH.WALL.PP..ORIEL..SCEIRDE.ROCKS..WEST.SOMER.LAG.TIDAL..WHITECROSS..HOOK.HEAD.SAC - (NIS.Vol.06.a.Sec.03.FIG.11)

Size: A3
Scale: 1:2,000,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
A	Final version	2024/03/07	JC	RRS/EA	JM

Vessel collision

226. Target 2 of the Conservation Objectives states that *"proposed activities or operations should not cause death or injury to individuals to an extent that may ultimately affect the harbour porpoise population at the site"*.

227. The Project alone assessment concluded that, giving consideration to primary mitigation measures, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from collision risk, either ex situ or in situ.

Assessment of the Project In-Combination

228. The risk of collision to marine mammals is expected to be primarily localised to within the boundaries of the respective projects. None of the project boundaries overlap with the Hook Head SAC. The vessel routes and potential ports used by other offshore projects are unknown, and therefore it is not possible to estimate the expected level of vessel activity within the Hook Head SAC from other projects. However, it is assumed that all other offshore projects in the Celtic and Irish Sea MU will either adopt a VMP or follow best practice codes of conduct on vessel handing around marine mammals[15] to minimise any potential effects on marine mammals and reduce risk of collision. As such, the potential for collision risk from CWP Project in-combination with other projects is considered negligible.

229. No harbour porpoise within the SAC are expected to experience death or injury from vessel collisions and as such, risk of collision will not adversely affect the harbour porpoise community at the site. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from collision risk from the CWP Project in-combination with other projects, and no potential for AESI overall.

Changes in prey availability

230. Target 2 of the Conservation Objectives states that "*Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site. This target also relates to proposed activities or operations that may result in the deterioration of key resources (e.g. water quality, feeding, etc.) upon which harbour porpoise depend*".

231. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with the Hook Head SAC from changes in prey availability, either ex situ or in situ.

Assessment of the Project In-Combination

232. Where multiple projects may impact upon harbour porpoise fish prey species or the habitats that support the prey within the site, there is the potential for in-combination indirect effects on the harbour porpoise community. Therefore, projects with the potential to act in-combination with CWP are those where the spatial footprint of activities (e.g., underwater noise, seabed disturbance) may encroach upon the SAC. This restricts relevant projects to the Dublin Array and NISA OWFs, which lie adjacent

[15] E.g. IWDG code of conduct (https://iwdg.ie/cms_files/wp-content/uploads/2022/06/Code-of-Conduct-When-Encountering-Whales-And-Dolphins-A3-Document.pdf), Sea Wise Code advised by NRW (https://naturalresources.wales/media/3513/sea-wise-code.pdf), South and West Wales seabird and seal code of conduct (https://www.welshwildlife.org/nature-reserves/code-conduct-seabirds-and-seals).

to the site. Given the comparable nature of these projects to CWP, it is likely that their potential for impacts to prey availability on the site is similar to that from CWP.

233. To inform this NIS, **Chapter 9 Fish, Shellfish and Turtle Ecology** of the EIAR prepared for the Project was referred to. The EIAR concludes that there will be no significant impact to any fish species from any impact pathway during the construction, operation or decommissioning of the CWP Project alone (this includes direct damage, disturbance, increased suspended sediment concentration (SSC) and sediment deposition, release of seabed contaminants, underwater noise etc.).

234. Considering the conclusions for the Project Alone assessment, the potential for CWP to provide a non-negligible contribution to in-combination effects on prey availability alongside other projects is considered to be remote. To inform this NIS assessment, the assessment of potential cumulative effects on fish and shellfish receptors carried out as a part of the EIAR (**Chapter 9 Fish, Shellfish and Turtle Ecology**) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to harbour porpoise prey species within the SAC, it does assess the broader potential for cumulative effects to these wide-ranging fish species to result from CWP in combination with relevant projects, including OWF projects on the east coast of Ireland, including Arklow Bank, Dublin Array and NISA. The EIAR concluded that impacts such as temporary habitat loss or disturbance, long-term habitat loss and increased suspended sediments concentrations are expected to occur over a spatial extent which is very small relative to the wider area over which developments occur, and relative to the size of available spawning and nursery areas for fish. Therefore, these impacts are considered negligible in the context of the wider availability of suitable habitat for marine mammal prey species. In summary, the cumulative assessment for fish and shellfish does not identify any significant cumulative effects resulting from the CWP Project alongside other projects. As such, it is anticipated that during the construction phase and any maintenance / decommissioning activities at CWP and other projects, any impacts to harbour porpoise prey availability will be negligible.

235. Considering the above, there is expected to be no long-term change to harbour porpoise prey species presence, abundance, condition or diversity; as such, there will be no deterioration of key resources (feeding) upon which harbour porpoises depend. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise community from changes in prey availability from the CWP Project in-combination with other projects, and no potential for AESI overall.

Changes in available habitat

236. Target 1 of the Conservation Objectives states that *"Species range within the site should not be restricted by artificial barriers to site use. This target may be considered relevant to proposed activities or operations that will result in the permanent exclusion of harbour porpoise from part of its range within the site or will permanently prevent access for the species to suitable habitat therein"*.

237. To recap, the Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with Hook Head SAC from changes in available habitat, either ex situ or in situ.

Assessment of the Project In-Combination

238. While offshore projects within the Celtic and Irish Sea MU have the potential to cause disturbance impacts to harbour porpoise, like CWP Project alone, the behavioural effects will be short-lived, and animals are expected to return to baseline activities following the cessation of activities. As such, no activities at any project are expected to result in the permanent exclusion of harbour porpoise from part of their range within the Hook Head SAC.

239. Considering the above, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from changes in available habitat from the CWP Project in-combination with other projects, and no potential for AESI overall.

3.10.2 Bottlenose dolphin

Table 3-25 Conservation objectives for the Hook Head SAC and summary of associated assessment of the CWP Project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
Range: Species range within the site should not be restricted by artificial barriers to site use. **Habitat:** Critical areas, representing habitat used preferentially by bottlenose dolphin, should be conserved in a natural condition. **Population:** Human activities should occur at levels that do not adversely affect the bottlenose dolphin population at the site.	Increased underwater noise:			Adverse effects on the qualifying Annex II features (bottlenose dolphin) of the Hook Head SAC will not occur as a result of impacts associated with the CWP Project in-combination with other projects.
	The CWP Project has committed to implementing both a UXO MMMP and a piling MMMP. Other projects are anticipated to comply with 'industry standards' and follow the NPWS (2014) guidance. Increased underwater noise from the CWP Project in-combination with other projects is not expected to: - adversely affect the range of the population or access to suitable habitat within the site(s); - result in significant disturbance to habitat used by bottlenose dolphins, or the natural behaviour of dolphins within critical areas; - adversely affect the bottlenose dolphin population at the site(s).	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the bottlenose dolphin feature of the site as a result of increased underwater noise from the CWP Project in-combination with other projects.	
	Collision risk:			
	The CWP Project has committed to implementing an EVMP. Other projects are anticipated to comply with Marine Wildlife Watching Codes. Collision risk	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the bottlenose dolphin feature of the site(s) as	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	from the CWP Project in-combination with other projects is not expected to: - adversely affect the range of the population or affect the access to suitable habitat within the site(s); - adversely affect critical habitat used by bottlenose dolphins, or the natural behaviour of dolphins within critical areas; and - adversely affect the bottlenose dolphin population at the site(s).		a result of collision risk from the CWP Project in-combination with other projects.	
	Changes in prey availability:			
	Changes in prey availability from the CWP Project in-combination with other projects are not expected to: - impact species range (no impact pathway); - adversely affect critical habitat used by bottlenose dolphins, or the natural behaviour of dolphins within critical areas; and - adversely affect the bottlenose dolphin population at the site(s).	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the bottlenose dolphin feature of the site(s) from changes in prey availability from the CWP Project in-combination with other projects.	
	Changes in available habitat:			
	Changes in available habitat from the CWP Project in-combination with other projects are not expected to:	No additional	There is no potential for impediment to the Conservation Objectives of the bottlenose	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	- adversely affect the range of the population or affect the access to suitable habitat within the site(s); - alter the natural behaviour to an extent that may ultimately interfere with key ecological functions; and - adversely affect the bottlenose dolphin population at the site(s).	mitigation is required.	dolphin feature of the site(s) from changes in available habitat from the CWP Project in-combination with other projects.	

Increased underwater noise

240. Target 2 of the Conservation Objectives states that *"proposed activities or operations should not introduce man-made energy (e.g. aerial or underwater noise, light or thermal energy) at levels that could result in a significant negative impact on individuals and / or the population of bottlenose dolphins within the site"*.

241. The Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is no potential for an impediment to the Conservation Objectives of the bottlenose dolphins associated with the Hook Head SAC from increased underwater noise, either ex situ or in situ.

Assessment of the Project In-Combination

242. This assessment focuses on the potential in-combination impact of construction activities at other offshore projects in the Irish Sea MU for dolphins in 2027 (the same year as piling at the CWP project). As outlined in **EIAR Chapter 11, Appendix 11.1 Cumulative effects assessment for marine mammals**, there are expected to be four other OWFs in the Irish Sea MU that will be constructing in 2027 as well as one tidal project, three coastal projects and one cable project (**Table 3-26**). As such, these offshore projects have been screened into the in-combination assessment for disturbance from underwater noise for bottlenose dolphins.

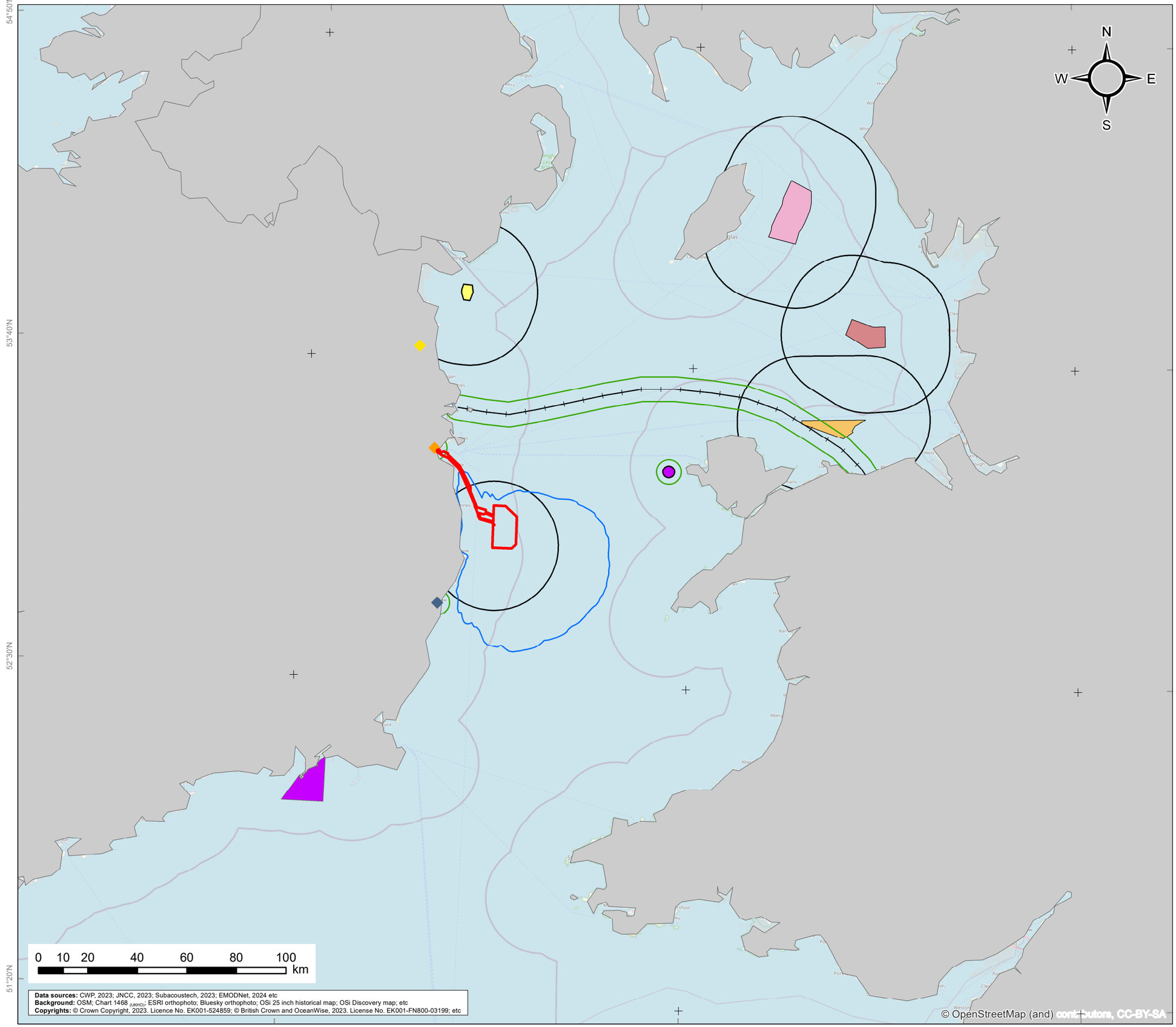
Table 3-26 Offshore projects constructing in the Irish Sea MU in 2027

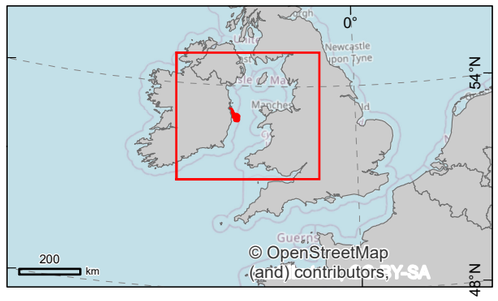
Project	Tier	Type
Codling	-	OWF
Awel y Môr	1	OWF
Arklow Waste Water Treatment	1	Coastal
Maintenance dredging River Boyne, Drogheda	1	Coastal
North Wall Emergency Power Generation Plant	1	Coastal
Oriel	2b	OWF
Morecambe	2b	OWF
Isle of Man	2b	OWF
Mares Connect	3	Cable
Holyhead Deep	3	Tidal

243. To quantitatively assess the potential for disturbance to the SAC for each of the projects in-combination, a 26 km (fixed) or 15 km (floating (i.e., anchor pile installation) and / or jacket (pin) pile installation) EDR was assumed as an indicative disturbance area for each OWF project (this follows the guidance in JNCC (2020) for disturbance assessments to dolphin SACs in England, Wales and Northern Ireland where 26 km EDR is advised for monopiles and 15 km EDR is advised for pin-piles – the same is assumed for bottlenose dolphins here in the absence of species-specific guidance). Additionally, it was assumed that coastal, tidal and cable projects require no piling activities and thus disturbance effects during construction are expected to be limited to activities such as dredging, trenching, cable laying, vessel activity etc for which a maximum 5 km EDR has been assumed (as per Pirotta et al. (2013) for dredging activities).

244. With regards in situ effects none of the projects have disturbance impact ranges that overlap with the Hook Head SAC (**Figure 3-9**). With regards ex situ effects 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 additional impact from other OWF projects is low in comparison and is thus not expected to result in enough additional disturbance to change the population trajectory. 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.

245. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the bottlenose dolphin population from disturbance from underwater noise from the CWP Project in-combination with other projects, and no potential for AESI overall.





Legend

- Planning application boundary
- 5 km EDR
- 26 km EDR
- SEL_{ss} 145 dB re µPa²s threshold
- North Wall Power Plant
- Arklow Waste Treatment Plant
- Dogheda Maintenance Dredge
- Holyhead Deep Tidal
- Mares Connect
- Oriel
- Awel y Mor
- Isle of Man
- Morcambe
- Hook Head SAC

codling wind park

Project: Codling Wind Park

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Figure 3.9:
Disturbance thresholds for piling in combination with the 5 km and 26 km EDR from other construction projects, in relation to the Hook Head SAC designated for bottlenose dolphins

CWP doc. number: CWP-SMR-ENG-08-01-MAP-1589

Internal descriptive code:
IS - PAB..DPNM.THRESH.SEL.5EDR.26EDR.CONT - ARK.WASTE.TP..AWEL.. DOGHEDA.MAIN.DREDGE..HOLY.DEEPTIDAL..ISLE.OF.MAN..MARES.CONNECT.. MORCAMBE..NORTH.WALL.PP..ORIEL..HOOK.HEAD.SAC - (NIS.Vol.06.a.Sec.03.FIG.02)

Size: A3
Scale: 1:1,500,000
CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
A	Final version	2024/06/17	JC	RRS/EA	JM

Vessel collision

246. Target 2 of the Conservation Objectives states that *"proposed activities or operations should not cause death or injury to individuals to an extent that may ultimately affect the bottlenose dolphin population at the site"*.

247. The Project alone assessment concluded that, giving consideration to primary mitigation measures, there is expected to be no potential for impediment to the Conservation Objectives of the bottlenose dolphin population from collision risk, either ex situ or in situ.

Assessment of the Project In-Combination

248. The risk of collision to marine mammals is expected to be primarily localised to within the boundaries of the respective projects. None of the project boundaries overlap with the Hook Head SAC. The vessel routes and potential ports used by other offshore projects are unknown, and therefore it is not possible to estimate the expected level of vessel activity within the Hook Head SAC from other projects. However, it is assumed that all other offshore projects in the Celtic and Irish Sea MU will either adopt a VMP or follow best practice codes of conduct on vessel handing around marine mammals[16] to minimise any potential effects on marine mammals and reduce risk of collision. As such, the potential for collision risk from CWP Project in-combination with other projects is considered negligible.

249. No bottlenose dolphins within the SAC are expected to experience death or injury from vessel collisions and as such, risk of collision will not adversely affect the bottlenose dolphin population at the site. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the bottlenose dolphin population from collision risk from the CWP Project in-combination with other projects, and no potential for AESI overall.

Changes in prey availability

250. Target 2 of the Conservation Objectives states that "*Human activities should occur at levels that do not adversely affect the bottlenose dolphin population at the site. This target also relates to proposed activities or operations that may result in the deterioration of key resources (e.g. water quality, feeding, etc.) upon which bottlenose dolphins depend*".

251. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives of the bottlenose dolphins associated with the Hook Head SAC from changes in prey availability, either ex situ or in situ.

Assessment of the Project In-Combination

252. Where multiple projects may impact upon bottlenose dolphin fish prey species or the habitats that support the prey within the site, there is the potential for in-combination indirect effects on the bottlenose dolphin population. Therefore, projects with the potential to act in-combination with CWP are those where the spatial footprint of activities (e.g., underwater noise, seabed disturbance) may encroach upon the SAC. This restricts relevant projects to the Dublin Array and NISA OWFs, which lie

[16] E.g. IWDG code of conduct (https://iwdg.ie/cms_files/wp-content/uploads/2022/06/Code-of-Conduct-When-Encountering-Whales-And-Dolphins-A3-Document.pdf), Sea Wise Code advised by NRW (https://naturalresources.wales/media/3513/sea-wise-code.pdf), South and West Wales seabird and seal code of conduct (https://www.welshwildlife.org/nature-reserves/code-conduct-seabirds-and-seals).

adjacent to the site. Given the comparable nature of these projects to CWP, it is likely that their potential for impacts to prey availability on the site is similar to that from CWP.

253. To inform this NIS, **Chapter 9 Fish, Shellfish and Turtle Ecology** of the EIAR prepared for the Project was referred to. The EIAR concludes that there will be no significant impact to any fish species from any impact pathway during the construction, operation or decommissioning of the CWP Project alone (this includes direct damage, disturbance, increased suspended sediment concentration (SSC) and sediment deposition, release of seabed contaminants, underwater noise etc.).

254. Considering the conclusions for the Project Alone assessment, the potential for CWP to provide a non-negligible contribution to in-combination effects on prey availability alongside other projects is considered to be remote. To inform this NIS assessment, the assessment of potential cumulative effects on fish and shellfish receptors carried out as a part of the EIAR (**Chapter 9 Fish, Shellfish and Turtle Ecology**) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to bottlenose dolphin prey species within the SAC, it does assess the broader potential for cumulative effects to these wide-ranging fish species to result from CWP in combination with relevant projects, including OWF projects on the east coast of Ireland, including Arklow Bank, Dublin Array and NISA. The EIAR concluded that impacts such as temporary habitat loss or disturbance, long-term habitat loss and increased suspended sediments concentrations are expected to occur over a spatial extent which is very small relative to the wider area over which developments occur, and relative to the size of available spawning and nursery areas for fish. Therefore, these impacts are considered negligible in the context of the wider availability of suitable habitat for marine mammal prey species. In summary, the cumulative assessment for fish and shellfish does not identify any significant cumulative effects resulting from the CWP Project alongside other projects. As such, it is anticipated that during the construction phase and any maintenance / decommissioning activities at CWP and other projects, any impacts to bottlenose dolphin prey availability will be negligible.

255. Considering the above, there is expected to be no long-term change to bottlenose dolphin prey species presence, abundance, condition or diversity; as such, there will be no deterioration of key resources (feeding) upon which bottlenose dolphins depend. There is, therefore, no potential for impediment to the Conservation Objectives of the bottlenose dolphin population from changes in prey availability from the CWP Project in-combination with other projects, and no potential for AESI overall.

Changes in available habitat

256. Target 1 of the Conservation Objectives states that *"Species range within the site should not be restricted by artificial barriers to site use. This target may be considered relevant to proposed activities or operations that will result in the permanent exclusion of bottlenose dolphins from part of its range within the site or will permanently prevent access for the species to suitable habitat therein"*.

257. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives of the bottlenose dolphin population associated with Hook Head SAC from changes in available habitat, either ex situ or in situ.

Assessment of the Project In-Combination

258. While offshore projects within the Celtic and Irish Sea MU have the potential to cause disturbance impacts to bottlenose dolphins, like CWP Project alone, the behavioural effects will be short-lived, and animals are expected to return to baseline activities following the cessation of activities. As such, no activities at any project are expected to result in the permanent exclusion of bottlenose dolphins from part of their range within the Hook Head SAC.

259. Considering the above, there is expected to be no potential for impediment to the Conservation Objectives of the bottlenose dolphins from changes in available habitat from the CWP Project in-combination with other projects, and no potential for AESI overall.

3.11 West Wales Marine SAC (UK0030397)

3.11.1 Harbour porpoise

Table 3-27 Conservation objectives for the West Wales SAC and summary of associated assessment of the CWP Project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
Range: Harbour porpoise is (i.e., remains) a viable component of the site. **Population:** There is no significant disturbance of the species. **Habitat:** The condition of supporting habitats and processes, and the availability of prey is maintained.	Increased underwater noise:			Adverse effects on the qualifying Annex II feature (harbour porpoise) of the West Wales SAC will not occur as a result of impacts associated with the CWP Project in-combination with other Projects.
	The CWP Project has committed to implementing both a UXO MMMP and a piling MMMP. Other projects are anticipated to comply with 'industry standards' and follow the NPWS (2014) guidance. Increased underwater noise at the CWP Project in-combination with other projects is not expected to: - restrict the survivability and reproductive potential of harbour porpoise using the site to the extent that could adversely affect the FCS; - lead to the exclusion of harbour porpoise from a significant proportion of the site for a significant period of time, in line with thresholds set in JNCC (2019); and	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of increased underwater noise from the CWP Project in-combination with other projects.	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	- impact the supporting habitats and processes (no impact pathway).			
	Collision risk:			
	The CWP Project has committed to implementing an EVMP. Other projects are anticipated to comply with Marine Wildlife Watching Codes. Collision risk from the CWP Project in-combination with other projects is not expected to: - restrict the survivability and reproductive potential of harbour porpoise using the site to the extent that could adversely affect the FCS; - contribute to disturbance of the species (no impact pathway); and - impact the supporting habitats and processes (no impact pathway).	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of collision risk from the CWP Project in-combination with other projects.	
	Changes in prey availability:			
	Changes in prey availability from the CWP Project in-combination with other projects are not expected to: - restrict the survivability and reproductive potential of harbour porpoise using the site to the	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of changes in prey availability from the CWP Project	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	extent that could adversely affect the FCS; - adversely affect the maintenance of supporting habitats and processes relevant to harbour porpoises and their prey within the site; and - contribute to disturbance of the species (no impact pathway).		in-combination with other projects.	
	Changes in available habitat:			
	Changes in available habitat from the CWP Project in-combination with other projects are not expected to: - restrict the survivability and reproductive potential of harbour porpoise using the site to the extent that could adversely affect the FCS; - adversely affect the maintenance of supporting habitats and processes relevant to harbour porpoises and their prey within the site; and - contribute to disturbance of the species (no impact pathway).	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of changes in available habitat from the CWP Project in-combination with other projects.	

Impact 1: Increased underwater noise

260. The Conservation Objectives of relevance are to ensure that *"harbour porpoise is a viable component of the site"* (minimise the risk of injury) and to ensure that *"there is no significant disturbance of the species"* .

261. The Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is no potential for an impediment to the Conservation Objectives of the harbour porpoise associated with the West Wales Marine SAC from increased underwater noise, either ex situ or in situ.

Assessment of the Project In-Combination

262. It is assumed that all offshore projects will put in place mitigation to reduce the risk of auditory injury (PTS) to negligible levels.

263. This assessment focuses on the potential in-combination impact of construction activities at other offshore projects in the Celtic and Irish Sea MU for porpoise in 2027 (the same year as piling at the CWP Project). As outlined in **EIAR Chapter 11, Appendix 11.1 Cumulative effects assessment for marine mammals**, there are expected to be seven other OWFs in the Celtic and Irish Sea MU that will be constructing in 2027 as well as two tidal projects, three coastal projects and one cable project (**Table 3-28**). As such, these offshore projects have been screened in to the in-combination assessment for disturbance from underwater noise for harbour porpoise.

Table 3-28 Offshore projects constructing in the Celtic and Irish Sea MU in 2027.

Project	Tier	Type
Codling	-	OWF
Awel y Môr	1	OWF
Erebus Floating Wind Demo	1	Floating
White Cross	1	Floating
West Somerset Tidal Lagoon	1	Tidal
Arklow Waste Water Treatment	1	Coastal
Maintenance dredging River Boyne, Drogheda	1	Coastal
North Wall Emergency Power Generation Plant	1	Coastal
Oriel	2b	OWF
Sceirde Rocks	2a	OWF
Morecambe	2b	OWF
Isle of Man	2b	OWF
Mares Connect	3	Cable
Holyhead Deep	3	Tidal

264. To quantitatively assess the potential for disturbance to the SAC for each of the projects in-combination, a 26 km (fixed) or 15 km (floating (i.e., anchor pile installation) and / or jacket (pin) pile installation) EDR was assumed as an indicative disturbance area for each OWF project (this follows

the guidance in JNCC (2020) for disturbance assessments to porpoise SACs in England, Wales and Northern Ireland where 26 km EDR is advised for monopiles and 15 km EDR is advised for pin-piles). Additionally, it was assumed that coastal, tidal and cable projects require no piling activities and thus disturbance effects during construction are expected to be limited to activities such as dredging, trenching, cable laying, and vessel activity for which a maximum 5 km EDR has been assumed (as per (McQueen et al., 2020) for dredging activities).

265. With regards in situ effects the CWP Project, and Erebus floating OWF were the only projects to have disturbance contours that overlapped with the boundary of the West Wales Marine SAC (see **Table 3-29** and Figure 3-10). Combined, the two projects impact 7.4% of the SAC area. This level of overlap does not constitute a significant disturbance, as it remains below the 20% daily threshold outlined within the Conservation Objectives. With regards ex situ effects, the level of disturbance predicted to occur within the Celtic and Irish Sea MU between 2023 and 2028, and in particular in 2027, 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. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the SAC from an increase in underwater noise from construction activities from CWP Project in-combination with other projects, either ex situ or in situ.

266. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from disturbance from underwater noise from the CWP Project in-combination with other projects, and no potential for AESI overall.

Table 3-29 Predicted overlap of disturbance contours from each OWF project constructing in 2027 and the boundary of the West Wales Marine SAC

Project	Type	Disturbance threshold	SAC overlap (km^2)
Codling	OWF	145 dB SEL_{ss}	487.9 km^2 (6.6% SAC)
		26 km EDR	0
Awel y Môr	OWF	26 km EDR	0
Morecambe	OWF	26 km EDR	0
Erebus (floating)	OWF	15 km EDR	60.9 km^2 (0.8% SAC)
White Cross (floating)	OWF	15 km EDR	0
Sceirde Rocks	OWF	26 km EDR	0
Oriel	OWF	26 km EDR	0
Isle of Man	OWF	26 km EDR	0
West Somerset Tidal Lagoon	Tidal	5 km EDR	0
Arklow Waste Water Treatment	Coastal	5 km EDR	0
Maintenance dredging River Boyne, Drogheda	Coastal	5 km EDR	0
North Wall Emergency Power Generation Plant	Coastal	5 km EDR	0
Mares Connect	Cable	5 km EDR	0
Holyhead Deep	Tidal	5 km EDR	0

10°0'W
6°40'W
3°20'W
54°10'N
52°0'N
49°50'N
N
W
E
S
0 10 20 40 60 80 100 km
Data sources: CWP, 2023; JNCC, 2023; Subacoustech, 2023; EMODNet, 2024 etc
Background: OSM; Chart 1468 (UKHO); ESRI orthophoto; Bluesky orthophoto; OSi 25 inch historical map; OSi Discovery map; etc
Copyrights: © Crown Copyright, 2023. Licence No. EK001-524859; © British Crown and OceanWise, 2023. License No. EK001-FN800-03199; etc

Legend

- Planning application boundary
- SEL_{ss} 145 dB re µPa²s threshold
- 5 km EDR
- 15 km EDR
- 26 km EDR
- North Wall Power Plant
- Arklow Waste Treatment Plant
- Dogheda Maintenance Dredge
- West Somerset Lagoon Tidal
- Holyhead Deep Tidal
- Mares Connect
- Whitecross
- Sceirde Rocks
- Oriel
- Awel y Mor
- Isle of Man
- Morcambe
- Erebus (Floating)
- West Wales Marine SAC

codling wind park

Project: Codling Wind Park

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Figure 3.10:
Disturbance thresholds for piling in combination with the 5 km, 15 km and 26 km EDR from other construction projects, in relation to the West Wales Marine SAC designated for harbour porpoise

CWP doc. number: CWP-SMR-ENG-08-01-MAP-1684

Internal descriptive code: IRE - PAB..DPNM.THRESH.SEL.5EDR.15EDR.26EDR.CONT. - ARK.WASTE.TP, AWEL..DOGHEDA.MAIN.DREDGE..EREBUS..HOLY.DEEP.TIDAL..ISLE.OF.MAN., MARES.CONNECT..MORCAMBE..NORTH.WALL.PP..ORIEL..SCEIRDE.ROCKS., WEST.SOMER.LAG.TIDAL..WHITECROSS..WEST.WALES.MARINE.SAC - (NIS.Vol.06.a.Sec.03.FIG.17)

Size: A3
Scale: 1:2,000,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
A	Final version	2024/07/17	JC	RRS/EA	JM

Impact 2: Collision risk

267. The Conservation Objective of relevance is to ensure that *"harbour porpoise is a viable component of the site"* (minimise the risk of injury).

268. The Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is no potential for an impediment to the Conservation Objectives for harbour porpoise within the West Wales Marine SAC from collisions with Project vessels.

Assessment of the Project In-Combination

269. The risk of collision to harbour porpoise is expected to be primarily localised to within the boundaries of the respective projects. With the exception of the Erebus floating OWF OECC, none of the boundaries of the other offshore projects overlap with the West Wales Marine SAC. The vessel routes and potential ports used by other offshore projects are unknown, and therefore it is not possible to estimate the expected level of vessel activity within the West Wales Marine SAC from other projects. However, it is assumed that all other offshore projects in the Celtic and Irish Sea MU will either adopt a VMP or follow best practice codes of conduct on vessel handing around marine mammals[17] to minimise any potential effects on marine mammals and reduce risk of collision. As such, the potential for collision with vessels from the CWP Project in-combination with other projects within the SAC is considered negligible.

270. No harbour porpoise within the SAC are expected to experience death or injury from vessel collisions and as such, risk of collision will not adversely affect the harbour porpoise at the site. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise from collision risk from the CWP Project in-combination with other projects, and no potential for AESI overall.

Impact 3: Changes in prey availability

271. The Conservation Objective of relevance is to ensure *"the condition of supporting habitats and processes, and the availability of prey is maintained"*.

272. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives for harbour porpoise associated with the West Wales Marine SAC from changes in prey availability.

Assessment of the Project In-Combination

273. Where multiple projects may impact upon harbour porpoise fish prey species or the habitats that support the prey within the site, there is the potential for in-combination indirect effects on the harbour porpoise community. Therefore, projects with the potential to act in-combination with CWP are those where the spatial footprint of activities (e.g., underwater noise, seabed disturbance) may encroach upon the SAC. To inform this NIS assessment, the assessment of potential cumulative effects on fish and shellfish receptors carried out as a part of the EIAR (**Chapter 9 Fish, Shellfish and Turtle Ecology**) was referred to. While the EIAR cumulative assessment does not specifically assess impacts

[17] E.g. IWDG code of conduct (https://iwdg.ie/cms_files/wp-content/uploads/2022/06/Code-of-Conduct-When-Encountering-Whales-And-Dolphins-A3-Document.pdf), Sea Wise Code advised by NRW (https://naturalresources.wales/media/3513/sea-wise-code.pdf), South and West Wales seabird and seal code of conduct (https://www.welshwildlife.org/nature-reserves/code-conduct-seabirds-and-seals).

to harbour porpoise prey species within the SAC, it does assess the broader potential for cumulative effects to these wide-ranging fish species to result from the CWP Project in combination with other offshore projects, including OWF projects on the east coast of Ireland, including Arklow Bank, Dublin Array and NISA. The EIAR concluded that impacts such as temporary habitat loss or disturbance, long-term habitat loss and increased suspended sediments concentrations are expected to occur over a spatial extent which is very small relative to the wider area over which developments occur, and relative to the size of available spawning and nursery areas for fish. Therefore, these impacts are considered negligible in the context of the wider availability of suitable habitat for harbour porpoise prey species. In summary, the cumulative assessment for fish and shellfish does not identify any significant cumulative effects resulting from the CWP Project alongside other projects.

Impact 4: Changes in available habitat

274. The Conservation Objective of relevance is to ensure *"the condition of supporting habitats and processes […] is maintained. Supporting habitats, in this context, means the characteristics of the seabed and water column. Processes encompass the movements and physical properties of the habitat".*

275. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives for harbour porpoise associated with the West Wales Marine SAC from changes in available supporting habitat.

Assessment of the Project In-Combination

276. To inform this NIS assessment, the assessment of potential cumulative effects on Marine Geology, Sediments and Coastal Processes carried out as a part of the EIAR (**Appendix 6.1 Marine Geology, Sediments and Coastal Processes Cumulative Effects Assessment** of the EIAR) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to the SAC, it does assess the broader potential for cumulative effects to result from CWP in combination with other offshore projects, including Dublin Array OWF, Arklow Bank Phase 2 OWF, Dublin Port MP2 project, Dublin Port maintenance dredging and Dublin Port capital dredging. No significant cumulative effects of suspended sediment concentration, sediment deposition, alteration in seabed morphology or changes to the hydrodynamic, wave and sediment regimes or coastal processes were identified. Therefore, it is assumed that there will be no significant impact to the marine geology, sediments and coastal processes within the West Wales Marine SAC.

277. Additionally, to inform this NIS assessment, the assessment of potential cumulative effects on marine water quality carried out as a part of the EIAR (**Appendix 7.1 Marine Water Quality Cumulative Effects Assessment** of the EIAR) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to the SAC, it does assess the broader potential for cumulative effects to result from CWP in combination with other offshore projects, including Arklow Bank Phase 2 OWF, Banba Wind OWF, Setanta Wind Park, Dublin Array OWF, Dublin Port dredging, Dublin Port MP2, Kilmichael Point Wind, Lir Offshore Array, Drogheda Port dredging, Mares Connect, NISA OWF etc. It was assumed that impacts at other offshore projects would be relatively similar to those at the CWP Project, and thus none of the impacts (increases in suspended sediment, resuspension of contaminated sediments or accidental pollution) across the cumulative projects resulted in a significant effect on marine water quality. Therefore, it is assumed that there will be no significant impact to the marine water quality within the West Wales Marine SAC.

278. In summary, there is not expected to be any significant effect to the supporting habitats within the West Wales Marine SAC from the CWP Project in combination with other projects.

3.12 Lleyn Peninsula and the Sarnau SAC (UK0013117)

3.12.1 Bottlenose dolphin

Table 3-30 Conservation objectives for the Lleyn Peninsula and the Sarnau SAC and summary of associated assessment of the CWP Project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
Range: The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future. **Supporting habitats and species:** The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing.	Increased underwater noise:			Adverse effects on the qualifying Annex II feature (bottlenose dolphin) of the Lleyn Peninsula and the Sarnau SAC will not occur as a result of impacts associated with the CWP Project in-combination with other Projects.
	The CWP Project has committed to implementing both a UXO MMMP and a piling MMMP. Other projects are anticipated to comply with 'industry standards' and follow the NPWS (2014) guidance. Increased underwater noise at the CWP Project in-combination with other projects is not expected to: - adversely affect the natural range of the population; - adversely affect the long-term maintenance of bottlenose dolphin population as a viable component of its natural habitat; and	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the bottlenose dolphin feature of the site as a result of increased underwater noise from the CWP Project in-combination with other projects	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
Populations: The population is maintaining itself on a long-term basis as a viable component of its natural habitat.	- contribute to impacts to supporting habitats and species no impact pathway).			
	Collision risk:			
	The CWP Project has committed to implementing an EVMP. Other projects are anticipated to comply with Marine Wildlife Watching Codes. Collision risk from the CWP Project in-combination with other projects is not expected to: - adversely affect the natural range of the population; - adversely affect the long-term maintenance of bottlenose dolphin population as a viable component of its natural habitat; - impact supporting habitats and species (no impact pathway).	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the bottlenose dolphin feature of the site as a result of collision risk from the CWP Project in-combination with other projects.	
	Changes in prey availability:			
	Changes in prey availability from the CWP Project in-combination with other projects are not expected to adversely affect:	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the bottlenose dolphin feature of the site from	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	- the natural range of the population; - supporting habitats and species; - the long-term maintenance of bottlenose dolphin population as a viable component of its natural habitat.		changes in prey availability from the CWP Project in-combination with other projects.	
	Changes in available habitat:			
	Changes in available habitat from the CWP Project in-combination with other projects is not expected to adversely affect: - the natural range of the population; - supporting habitats and species; - the long-term maintenance of bottlenose dolphin population as a viable component of its natural habitat.	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the bottlenose dolphin feature of the site from changes in available habitat from the CWP Project in-combination with other projects.	

Impact 1: Increased underwater noise

279. With regards to underwater noise the Conservation Objectives state that *"The population is maintaining itself on a long-term basis as a viable component of its natural habitat"* and *"The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future"* (NRW, 2018b).

280. For auditory injury, the Project Alone assessment concluded that proposed activities at the CWP project will not cause auditory injury to bottlenose dolphins.

281. For disturbance, the Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is no potential for an impediment to the Conservation Objectives of the Lleyn Peninsula and the Sarnau SAC from increased underwater noise.

282. This in-combination assessment focuses on the potential impact of disturbance from construction activities at other offshore projects in the Irish Sea MU for bottlenose dolphins in 2027 (the same year as piling at the CWP Project). As outlined in **EIAR Chapter 11, Appendix 11.1 Cumulative effects assessment for marine mammals**, there are expected to be four other OWFs in the Irish Sea MU that will be constructing in 2027 as well as one tidal project, three coastal projects and one cable project (**Table 3-31**). As such, these offshore projects have been screened into the in-combination assessment for disturbance from underwater noise for bottlenose dolphins.

Table 3-31 Offshore projects constructing in the Irish Sea MU in 2027.

Project	Tier	Type
Codling	-	OWF
Awel y Môr	1	OWF
Arklow Waste Water Treatment	1	Coastal
Maintenance dredging River Boyne, Drogheda	1	Coastal
North Wall Emergency Power Generation Plant	1	Coastal
Oriel	2b	OWF
Morecambe	2b	OWF
Isle of Man	2b	OWF
Mares Connect	3	Cable
Holyhead Deep	3	Tidal

283. To quantitatively assess the potential for disturbance to the SAC for each of the projects in-combination, a 26 km (fixed) or 15 km (floating (i.e., anchor pile installation) and / or jacket (pin) pile installation) EDR was assumed as an indicative disturbance area for each OWF project (this follows the guidance in JNCC (2020) for disturbance assessments to porpoise SACs in England, Wales and Northern Ireland where 26 km EDR is advised for monopiles and 15 km EDR is advised for pin-piles – the same is assumed for bottlenose dolphins here in the absence of species-specific guidance). Additionally, it was assumed that coastal, tidal and cable projects require no piling activities and thus disturbance effects during construction are expected to be limited to activities such as dredging, trenching, cable laying, vessel activity etc for which a maximum 5 km EDR has been assumed (as per Pirotta et al. (2013) for dredging activities).

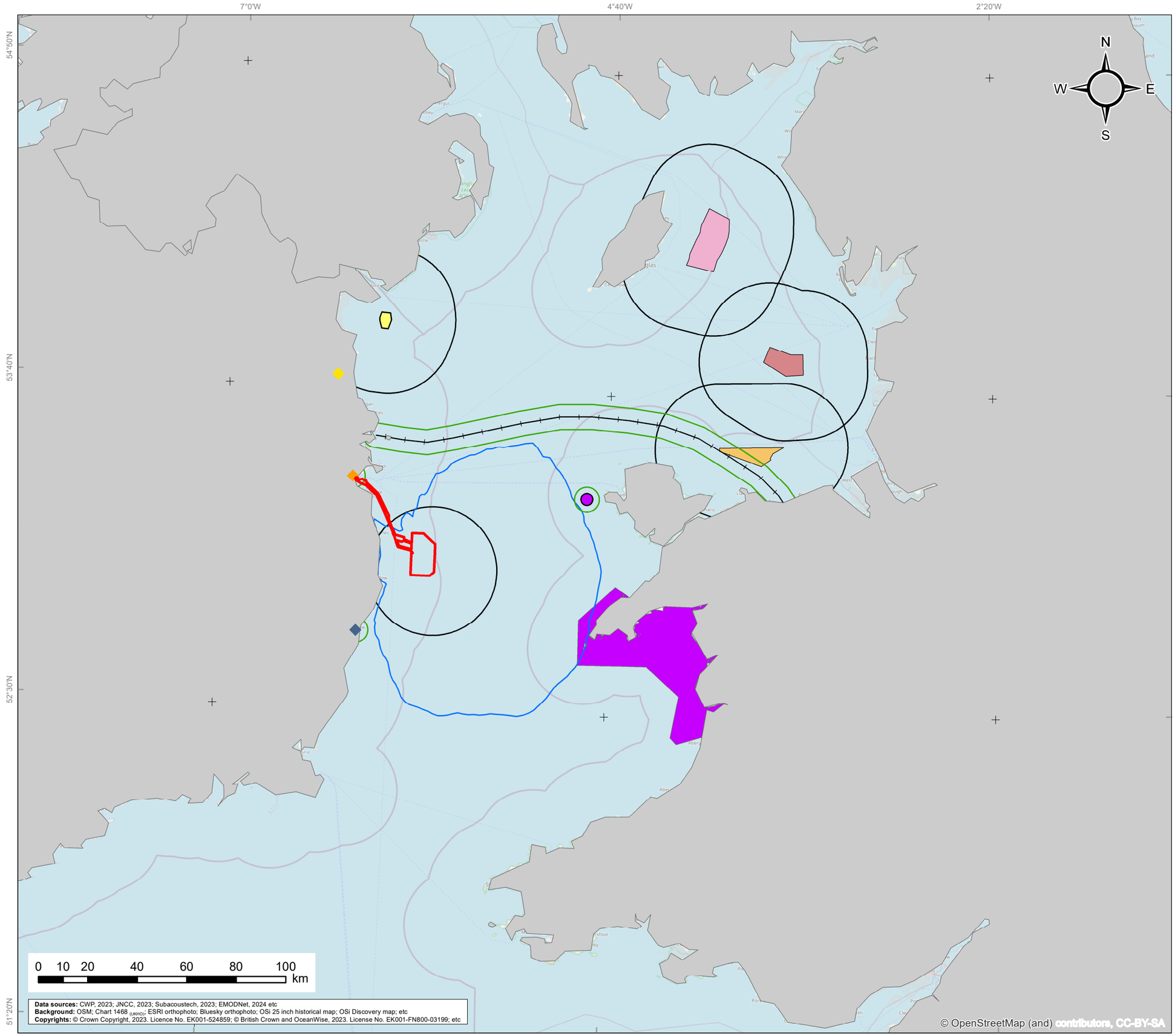
284. With regards in situ effects the CWP Project was the only project to have disturbance contours that overlapped with the boundary of the Lleyn Peninsula and the Sarnau SAC (see **Table 3-32** and **Figure 3-11**). The population is expected to maintain itself on a long-term basis as a viable component of its natural habitat and the natural range of the population is not expected to be reduced. With regards ex situ effects 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 additional impact from other OWF projects is low in comparison and is thus not expected to result in enough additional disturbance to change the population trajectory. 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.

285. There is, therefore, no potential for impediment to the Conservation Objectives of the bottlenose dolphin feature of the SAC from an increase in underwater noise from construction activities from CWP Project in-combination with other projects, and no potential for AESI overall.

Table 3-32 Predicted overlap of disturbance contours from each offshore project and the boundary of the Lleyn Peninsula and the Sarnau SAC

Project	Type	Disturbance threshold	SAC overlap (km^2)	Conclusions of the RIAA (where available)
Codling	OWF	145 dB SEL_{ss}	68.6	No potential for an impediment to the Conservation Objectives of the bottlenose dolphin feature of the Lleyn Peninsula and the Sarnau SAC.
Awel y Môr	OWF	26 km EDR	0	"No potential for an AEoI to the Conservation Objectives of the bottlenose dolphin feature of all sites screened in for disturbance (underwater noise) from AyM alone" [18]
Arklow Waste Water Treatment	Coastal	5 km EDR	0	Not available within the public domain
Maintenance dredging River Boyne, Drogheda	Coastal	5 km EDR	0	Not available within the public domain
North Wall Emergency Power Generation Plant	Coastal	5 km EDR	0	Not available within the public domain
Oriel	OWF	26 km EDR	0	Not yet published
Morcambe	OWF	26 km EDR	0	"No significant disturbance effect on the bottlenose dolphin IS MU population or the Cardigan Bay SAC population from underwater noise during piling" [19]
Isle of Man	OWF	26 km EDR	0	Not available within the public domain
Mares Connect	Coastal	5 km EDR	0	Not yet published
Holyhead Deep	Tidal	5 km EDR	0	Not available within the public domain

[18] Awel y Môr Offshore Wind Farm. Report 5.2: Report to Inform Appropriate Assessment. April 2022.
[19] Morcambe Offshore Windfarm. Draft Report to Inform the Appropriate Assessment. March 2023.



Legend

- Planning application boundary
- 5 km EDR
- 26 km EDR
- SEL_{ss} 145 dB re µPa²s
- North Wall Power Plant
- Arklow Waste Treatment Plant
- Dogheda Maintenance Dredge
- Holyhead Deep Tidal
- Mares Connect
- Oriel
- Awel y Mor
- Isle of Man
- Morcambe
- Llyn Peninsula and the Sarnau SAC

codling wind park

Project: Codling Wind Park

SMRU Consulting
understand • assess • mitigate

Figure 3.11:
Disturbance thresholds for piling in combination with the 5 km and 26 km EDR from other construction projects, in relation to the Llyn Peninsula and the Sarnau SAC designated for bottlenose dolphins

CWP doc. number: CWP-SMR-ENG-08-01-MAP-1670

Internal descriptive code: IS - PAB..DPNM.THRESH.SEL.5EDR.26EDR.CONT - ARK.WASTE.TP..AWEL..DOGHEDA.MAIN.DREDGE..HOLY.DEEP.TIDAL..ISLE.OF.MAN..MARES.CONNECT..MORCAMBE..NORTH.WALL.PP..ORIEL..LLEYN.PEN.SARNAU.SAC - (NIS.Vol.06.a.Sec.03.FIG.03)

Size: A3
Scale: 1:1,500,000

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286. It is acknowledged that bottlenose dolphins will range outside of the SAC, and thus the potential impact to the Irish Sea MU as a whole is also relevant to consider. Assuming all projects are conducting construction activities at the same time, then up to 2,715 bottlenose dolphins in the Irish Sea MU are predicted to experience disturbance per construction day (

287. **Table** 3-33). This equates to 32.6% of the Irish Sea MU (assuming the MU is 8,326 dolphins, as per Gilles et al. (2023)). 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 additional impact from other projects is low in comparison and is thus not expected to result in enough additional disturbance to change the population trajectory.

288. What is important to consider here is the residency of bottlenose dolphins 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. While the wider SAC population is considered to be mainly resident across the Lleyn Peninsula and the Sarnau SAC and the Cardigan Bay SAC areas, bottlenose dolphins across the wider Irish Sea MU are expected to be mainly comprised of the offshore ecotype which is considered to be more of a transient species in the area. It is therefore unlikely that individuals would remain in the impacted area over a sufficient number of consecutive days to experience a level of disturbance that could impact their vital rates. Temporary changes in behaviour and / or distribution of individuals within the Irish Sea MU 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 MU population size or trajectory.

289. Considering the above, disturbance is expected to be temporary and highly unlikely to result in any changes to the trajectory of the Irish Sea MU. Therefore, the population is expected to maintain itself on a long-term basis as a viable component of its natural habitat and the natural range of the population is not expected to be reduced. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the bottlenose dolphin feature from disturbance caused by underwater noise from the CWP Project in-combination with other projects, and no potential for AESI overall.

Table 3-33 Number of bottlenose dolphins within the Irish Sea MU predicted to be disturbed by each project in 2027.

OWF	Disturbance threshold	SCANS IV block	Density (#/km^2)	# disturbed
Codling	Dose-response	CS-D	0.2352	2,060
Awel y Môr	26 km EDR	CS-E	0.0104	22
Arklow Waste Water Treatment	5 km EDR	CS-D	0.2352	18
Maintenance dredging River Boyne, Drogheda	5 km EDR	CS-D	0.2352	18
North Wall Emergency Power Generation Plant	5 km EDR	CS-D	0.2352	18
Oriel	26 km EDR	CS-D	0.2352	499
Morcambe	26 km EDR	CS-E	0.0104	22
Isle of Man	26 km EDR	CS-E	0.0104	22
Mares Connect	5 km EDR	CS-D	0.2352	18
Holyhead Deep	5 km EDR	CS-E	0.0104	18

Impact 2: Collision risk

290. With regards to collision risk the Conservation Objectives state that *"The population is maintaining itself on a long-term basis as a viable component of its natural habitat"* (NRW, 2018b). Therefore, injury or mortality from vessel collisions should not result in a change to the population size.

291. The Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is expected to be no potential for impediment to the Conservation Objectives of the Lleyn Peninsula and the Sarnau SAC from collision risk.

292. Vessel activity associated with the CWP Project and other offshore projects in the Irish Sea MU will be confined to the respective project areas and vessels will follow transit routes to and from ports, in areas characterised by relatively high levels of baseline traffic. The risk of collision to bottlenose dolphins is expected to be localised to within the boundaries of the respective projects, none of which overlap with the Lleyn Peninsula and the Sarnau SAC. It is assumed that all other offshore projects in the Irish Sea MU will either adopt a VMP or follow best practice codes of conduct on vessel handing around marine mammals[20] to minimise any potential effects on marine mammals and reduce risk of collision. As such, the potential for collision risk from the CWP Project in-combination with other projects is considered negligible.

293. Considering the above, no bottlenose dolphins present within the Lleyn Peninsula and the Sarnau SAC or in the wider Irish Sea MU are expected to experience death or injury from vessel collisions and

[20] E.g. IWDG code of conduct (https://iwdg.ie/cms_files/wp-content/uploads/2022/06/Code-of-Conduct-When-Encountering-Whales-And-Dolphins-A3-Document.pdf), Sea Wise Code advised by NRW (https://naturalresources.wales/media/3513/sea-wise-code.pdf), South and West Wales seabird and seal code of conduct (https://www.welshwildlife.org/nature-reserves/code-conduct-seabirds-and-seals).

thus the population is expected to maintain itself on a long-term basis. There is, therefore, no potential for impediment to the Conservation Objectives of the bottlenose dolphin feature from collision risk from CWP Project in-combination with other projects, and no potential for AESI overall.

Impact 3: Changes in prey availability

294. The Conservation Objectives state that *"The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing"* (NRW, 2018b).

295. As stated in the latest feature condition assessment (NRW, 2018a) *"we do not have enough information about bottlenose dolphin prey species and the status of fish stocks to produce a meaningful assessment for this component"* (NRW, 2018a). Overall, the supporting habitat (including the prey availability and quality component) was assessed as **unknown**. This makes it unfeasible to undertake an assessment against a specific condition assessment within this NIS, however an assessment has been presented on a precautionary basis through reference to the site specific assessment on fish and shellfish (**Chapter 9 Fish, Shellfish and Turtle Ecology**).

296. The Project Alone assessment concluded that there is expected to be no potential for impediment to the Conservation Objectives of the Lleyn Peninsula and the Sarnau SAC from changes in prey availability.

297. Where multiple projects may impact bottlenose dolphin fish prey species or the habitats that support the prey within the site, there is the potential for in-combination indirect effects on the bottlenose dolphin population. To inform this NIS assessment, the assessment of potential cumulative effects on fish and shellfish receptors carried out as a part of the EIAR (**Chapter 9 Fish, Shellfish and Turtle Ecology**) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to bottlenose dolphin prey species within the Lleyn Peninsula and the Sarnau SAC, it does assess the broader potential for cumulative effects to these wide-ranging fish species to result from the CWP Project in combination with relevant projects, including OWF projects on the east coast of Ireland, including Arklow Bank, Dublin Array and NISA. The EIAR concluded that impacts such as temporary habitat loss or disturbance, long-term habitat loss and increased suspended sediments concentrations are expected to occur over a spatial extent which is very small relative to the wider area over which developments occur, and relative to the size of available spawning and nursery areas for fish. Therefore, these impacts are considered negligible in the context of the wider availability of suitable habitat for marine mammal prey species. In summary, the cumulative assessment for fish and shellfish does not identify any significant cumulative effects resulting from the CWP Project alongside other projects. As such, it is anticipated that during the construction phase and any maintenance / decommissioning activities at CWP and other projects, any impacts to bottlenose dolphin prey availability will be negligible.

298. Considering the above there is expected to be no long-term change to bottlenose dolphin prey species presence, abundance, condition or diversity. As such, changes in prey availability will not affect the distribution, abundance and population dynamics of bottlenose dolphins within and beyond the site. There is, therefore, no potential for impediment to the Conservation Objectives of the bottlenose dolphin feature from changes in prey availability from the CWP Project in combination with other projects, and no potential for AESI overall.

Impact 4: Changes in available habitat

299. The Conservation Objectives state that *"The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future"* (NRW, 2018b).

300. As stated in the latest feature condition assessment (NRW, 2018a) *"there is no specifically defined 'dolphin habitat'. The presence of dolphins at a location implies that the habitat is suitable but presence is largely driven by prey availability. This component has been assessed as unknown"* (NRW, 2018a). This makes it unfeasible to unfeasible to undertake an assessment against a specific condition assessment within this NIS, however an assessment has been presented on a precautionary basis. Prey availably is assessed separately above.

301. The Project Alone assessment concluded that there is expected to be no potential for impediment to the Conservation Objectives of the Lleyn Peninsula and the Sarnau SAC from changes in available habitat.

302. While offshore projects within the Irish Sea MU have the potential to cause disturbance impacts to bottlenose dolphins, like the CWP Project alone, no activities at any project are expected to result in the permanent exclusion of bottlenose dolphins from part of their range within the Lleyn Peninsula and the Sarnau SAC or in the wider MU. Any potential disturbance effects will be temporary. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the bottlenose dolphin feature from changes in available habitat from the CWP Project in-combination with other projects, and no potential for AESI overall.

3.12.2 Grey seals

Table 3-34 Conservation objectives for the Lleyn Peninsula and the Sarnau SAC and summary of associated assessment of the CWP Project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
Range: The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future. **Supporting habitats and species:** The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. **Populations:** The population is maintaining itself on a long-term basis as a	Increased underwater noise: The CWP Project has committed to implementing both a UXO MMMP and a piling MMMP. Other projects are anticipated to comply with 'industry standards' and follow the NPWS (2014) guidance. Increased underwater noise at CWP Project in-combination with other projects is not expected to: - adversely affect the natural range of the population; - adversely affect the long-term maintenance of grey seal population as a viable component of its natural habitat; - contribute to impacts to supporting habitats and species no impact pathway).	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the grey seal feature of the site as a result of increased underwater noise from the CWP Project in-combination with other projects.	Adverse effects on the qualifying Annex II features (grey seals) of the Lleyn Peninsula and the Sarnau SAC will not occur as a result of impacts associated with the CWP Project in-combination with other Projects.

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
viable component of its natural habitat.				
	Collision risk:			
	The CWP Project has committed to implementing an EVMP. Other projects are anticipated to comply with Marine Wildlife Watching Codes. Collision risk from the CWP Project in-combination with other projects is not expected to: - adversely affect the natural range of the population; - adversely affect the long-term maintenance of grey seal population as a viable component of its natural habitat; - impact supporting habitats and species (no impact pathway).	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the grey seal feature of the site as a result of collision risk from the CWP Project in-combination with other projects.	
	Changes in prey availability:			
	Changes in prey availability from the CWP Project in-combination with other projects are not expected to adversely affect:	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the grey seal feature of the site from changes in prey availability from the CWP	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	- the natural range of the population; - supporting habitats and species; - the long-term maintenance of grey seal population as a viable component of its natural habitat.		Project in-combination with other projects.	
	Changes in available habitat:			
	Changes in available habitat from the CWP Project in-combination with other projects is not expected to adversely affect: - the natural range of the population; - supporting habitats and species; - the long-term maintenance of grey seal population as a viable component of its natural habitat.	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the grey seal feature of the site from changes in available habitat from the CWP Project in-combination with other projects.	

Impact 1: Increased underwater noise

303. With regards to underwater noise the Conservation Objectives state that *"The population is maintaining itself on a long-term basis as a viable component of its natural habitat"* and *"The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future"* (NRW, 2018b).

304. For auditory injury, the Project Alone assessment concluded that proposed activities at the CWP project will not cause auditory injury to grey seals.

305. For disturbance, the Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is no potential for an impediment to the Conservation Objectives of the Lleyn Peninsula and the Sarnau SAC from increased underwater noise.

306. This in-combination assessment focuses on the potential impact of disturbance from construction activities at other offshore projects in the east Ireland and Northern Ireland MUs for grey seals in 2027 (the same year as piling at the CWP Project). As outlined in **EIAR Chapter 11, Appendix 11.1 Cumulative effects assessment for marine mammals**, there are expected to be one other OWF in the MU that will be constructing in 2027 as well as three coastal projects and one cable project (**Table 3-35**). As such, these offshore projects have been screened into the in-combination assessment for disturbance from underwater noise for grey seals.

Table 3-35 Offshore projects constructing in the grey seal MU in 2027

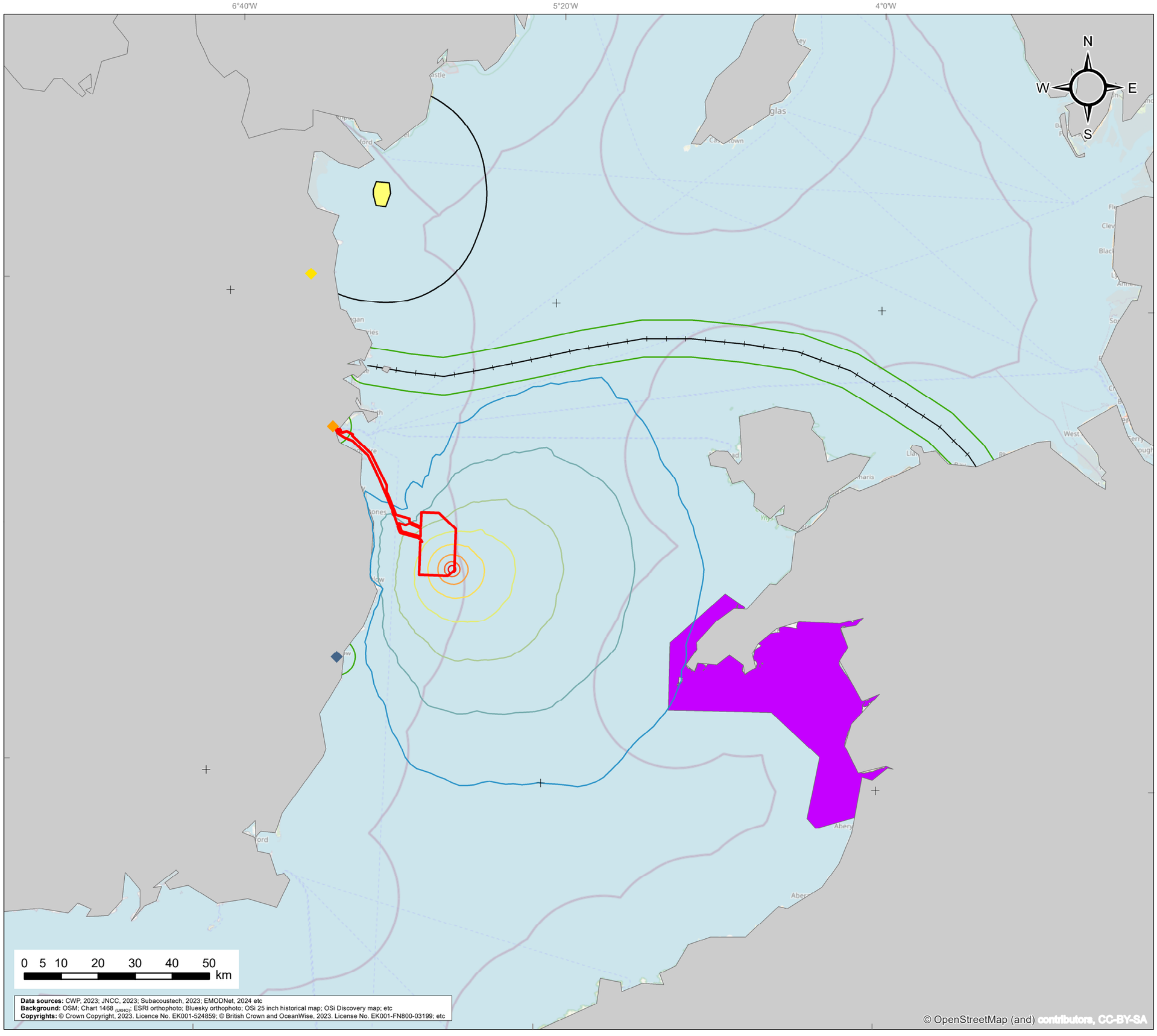
Project	Tier	Type
Codling	-	OWF
Arklow Waste Water Treatment	1	Coastal
Maintenance dredging River Boyne, Drogheda	1	Coastal
North Wall Emergency Power Generation Plant	1	Coastal
Oriel	2b	OWF
Mares Connect	3	Cable

307. To quantitatively assess the potential for disturbance to the SAC for each of the projects in-combination, a 26 km (fixed) EDR was assumed as an indicative disturbance area for each OWF project (this follows the guidance in JNCC (2020) for disturbance assessments to porpoise SACs in England, Wales and Northern Ireland where 26 km EDR is advised for monopiles – the same is assumed for grey seals here in the absence of species-specific guidance). Additionally, it was assumed that coastal and cable projects require no piling activities and thus disturbance effects during construction are expected to be limited to activities such as dredging, trenching, cable laying, vessel activity etc for which a maximum 5 km EDR has been assumed.

308. With regards in situ effects none of the projects in the grey seal MU have disturbance contours that overlapped with the boundary of the Lleyn Peninsula and the Sarnau SAC (**Figure 3-12**). It is noted that there will also be projects outside of the combined east Ireland and Northern Ireland MUs, in the wider Irish Sea constructing in 2027 (e.g. Awel y Môr OWF, Morcambe OWF and Isle of Man OWF), however 26 km EDRs from these projects will also not overlap with the SAC. With regards ex situ effects the level of disturbance predicted to occur, is expected to potentially 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.

309. The population is expected to maintain itself on a long-term basis as a viable component of its natural habitat and the natural range of the population is not expected to be reduced. There is, therefore, no potential for impediment to the Conservation Objectives of the grey seal feature of the SAC from an increase in underwater noise from construction activities from CWP Project in-combination with other projects, and no potential for AESI overall.



Legend

- Planning application boundary
- SEL_{ss} dB re µPa²s (5dB) SE location
- 145 dB
- 150 dB
- 155 dB
- 160 dB
- 165 dB
- 170 dB
- 175 dB
- 180 dB
- 5 km EDR
- 25 km EDR
- North Wall Power Plant
- Arklow Waste Treatment Plant
- Dogheda Maintenance Dredge
- Mares Connect
- Oriel
- Llyn Peninsula and the Sarnau SAC

codling wind park

Project: Codling Wind Park

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Figure 3.12:
Disturbance contours for piling at the Southeast modelling location using the seal dose-response function, in combination with the 5 km and 25 km EDR from other wind farms in relation to the Lleyn Peninsula and the Sarnau SAC

CWP doc. number: CWP-SMR-ENG-08-01-MAP-1687

Internal descriptive code:
IS - PAB..DPNM.CONT.WTG.SE..THRESH.5EDR.25EDR.CONT - ARK.WASTE.TP.. DOGHEDA.MAIN.DREDGE..MARES.CONNECT..NORTH.WALL.PP..ORIEL.. LLEYN.PEN.SARNAU.SAC - (NIS.Vol.06.a.Sec.03.FIG.20)

Size: A3
Scale: 1:1,000,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
A	Final version	2024/07/17	JC	RRS/EA	JM

Impact 2: Collision risk

310. With regards to collision risk the Conservation Objectives state that *"The population is maintaining itself on a long-term basis as a viable component of its natural habitat"* (NRW, 2018b). Therefore, injury or mortality from vessel collisions should not result in a change to the population size.

311. The Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is expected to be no potential for impediment to the Conservation Objectives of the Lleyn Peninsula and the Sarnau SAC from collision risk.

312. Vessel activity associated with the CWP Project and other offshore projects in the Irish Sea will be confined to the respective project areas and vessels will follow transit routes to and from ports, in areas characterised by relatively high levels of baseline traffic. The risk of collision to grey seals is expected to be localised to within the boundaries of the respective projects, none of which overlap with the Lleyn Peninsula and the Sarnau SAC. It is assumed that all other offshore projects in the Irish Sea MU will either adopt a VMP or follow best practice codes of conduct on vessel handing around marine mammals[21] to minimise any potential effects on marine mammals and reduce risk of collision. As such, the potential for collision risk from the CWP Project in-combination with other projects is considered negligible.

313. Considering the above, no grey seals present within the Lleyn Peninsula and the Sarnau SAC or in the wider Irish Sea are expected to experience death or injury from vessel collisions and thus the population is expected to maintain itself on a long-term basis. There is, therefore, no potential for impediment to the Conservation Objectives of the grey seal feature from collision risk from CWP Project in-combination with other projects, and no potential for AESI overall.

Impact 3: Changes in prey availability

314. The Conservation Objectives state that *"The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing"* (NRW, 2018b).

315. As stated in the latest feature condition assessment (NRW, 2018a) the supporting habitat (including the prey availability and quality component) was assessed as unknown. This makes it unfeasible to undertake an assessment against a specific condition assessment within this NIS, however an assessment has been presented through reference to the site specific assessment on fish and shellfish (**Chapter 9 Fish, Shellfish and Turtle Ecology**).

316. The Project Alone assessment concluded that there is expected to be no potential for impediment to the Conservation Objectives of the Lleyn Peninsula and the Sarnau SAC from changes in prey availability.

317. Where multiple projects may impact grey seal fish prey species or the habitats that support the prey within the site, there is the potential for in-combination indirect effects on the grey seal population. To inform this NIS assessment, the assessment of potential cumulative effects on fish and shellfish receptors carried out as a part of the EIAR (**Chapter 9 Fish, Shellfish and Turtle Ecology**) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to grey seal prey species within the Lleyn Peninsula and the Sarnau SAC, it does assess the broader potential for cumulative effects to these wide-ranging fish species to result from the CWP Project in combination

[21] E.g. IWDG code of conduct (https://iwdg.ie/cms_files/wp-content/uploads/2022/06/Code-of-Conduct-When-Encountering-Whales-And-Dolphins-A3-Document.pdf), Sea Wise Code advised by NRW (https://naturalresources.wales/media/3513/sea-wise-code.pdf), South and West Wales seabird and seal code of conduct (https://www.welshwildlife.org/nature-reserves/code-conduct-seabirds-and-seals).

with relevant projects, including OWF projects on the east coast of Ireland, including Arklow Bank, Dublin Array and NISA. The EIAR concluded that impacts such as temporary habitat loss or disturbance, long-term habitat loss and increased suspended sediments concentrations are expected to occur over a spatial extent which is very small relative to the wider area over which developments occur, and relative to the size of available spawning and nursery areas for fish. Therefore, these impacts are considered negligible in the context of the wider availability of suitable habitat for marine mammal prey species. In summary, the cumulative assessment for fish and shellfish does not identify any significant cumulative effects resulting from the CWP Project alongside other projects. As such, it is anticipated that during the construction phase and any maintenance / decommissioning activities at CWP and other projects, any impacts to grey seal prey availability will be negligible.

318. Considering the above there is expected to be no long-term change to grey seal prey species presence, abundance, condition or diversity. As such, changes in prey availability will not affect the distribution, abundance and population dynamics of grey seals within and beyond the site. There is, therefore, no potential for impediment to the Conservation Objectives of the grey seal feature from changes in prey availability from the CWP Project in combination with other projects, and no potential for AESI overall.

Impact 4: Changes in available habitat (seal haul-outs)

319. The Project Alone assessment concluded that there is expected to be no potential for impediment to the Conservation Objectives of the Lleyn Peninsula and the Sarnau SAC from changes in available habitat.

320. Grey seals could potentially be disturbed at and around haul-out sites from offshore activities. However, given the distance between the offshore projects and the Lleyn Peninsula and the Sarnau SAC it is anticipated that there is no potential for the alteration of natural breeding behaviours, the displacement of individuals from a moult haul-out site or alteration of natural moulting behaviours nor the displacement of individuals from a resting haul-out site to an extent that may ultimately interfere with key ecological functions.

321. Vessel activity associated with the CWP Project and other offshore projects in the Irish Sea will be confined to the respective project areas and vessels will follow transit routes to and from ports, in areas characterised by relatively high levels of baseline traffic. It is not expected that vessel traffic from any of the projects will enter into the Lleyn Peninsula and the Sarnau SAC and thus there is no potential for grey seals to be disturbed from their haul out sites within the SAC. It is anticipated that there is no potential for the alteration of natural breeding behaviours, the displacement of individuals from a moult haul-out site or alteration of natural moulting behaviours nor the displacement of individuals from a resting haul-out site to an extent that may ultimately interfere with key ecological functions.

322. There is, therefore, no potential for an impediment to the Conservation Objectives of the grey seal features from changes in available habitat (seal haul-outs) from CWP Project in combination with other projects, and no potential for AESI overall.

3.13 Cardigan Bay / Bae Ceredigion SAC (UK0012712)

3.13.1 Bottlenose dolphin

Table 3-36 Conservation objectives for the Cardigan Bay / Bae Ceredigion SAC and summary of associated assessment of the CWP Project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
Range: The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future. **Supporting habitats and species:** The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. **Populations:** The population is maintaining itself on a long-term basis as a viable component of its natural habitat.	Increased underwater noise:			Adverse effects on the qualifying Annex II feature (bottlenose dolphin) of the Cardigan Bay SAC will not occur as a result of impacts associated with the CWP Project in-combination with other Projects.
	The CWP Project has committed to implementing both a UXO MMMP and a piling MMMP. Other projects are anticipated to comply with 'industry standards' and follow the NPWS (2014) guidance. Increased underwater noise at CWP Project in-combination with other projects is not expected to: - adversely affect the natural range of the population; - adversely affect the long-term maintenance of bottlenose dolphin population as a viable component of its natural habitat; and - contribute to impacts to supporting habitats and species no impact pathway).	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the bottlenose dolphin feature of the site as a result of increased underwater noise from the CWP Project in-combination with other projects	
	Collision risk:			
	The CWP Project has committed to implementing an EVMP. Other projects are anticipated to comply with Marine Wildlife	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the bottlenose dolphin feature of the site as	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	Watching Codes. Collision risk from the CWP Project in-combination with other projects is not expected to: - adversely affect the natural range of the population; - adversely affect the long-term maintenance of bottlenose dolphin population as a viable component of its natural habitat; - impact supporting habitats and species (no impact pathway).		a result of collision risk from the CWP Project in-combination with other projects.	
	Changes in prey availability:			
	Changes in prey availability from the CWP Project in-combination with other projects are not expected to adversely affect: - the natural range of the population; - supporting habitats and species; - the long-term maintenance of bottlenose dolphin population as a viable component of its natural habitat.	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the bottlenose dolphin feature of the site from changes in prey availability from the CWP Project in-combination with other projects.	
	Changes in available habitat:			
	Changes in available habitat from the CWP Project in-combination with other projects is not expected to adversely affect: - the natural range of the population;	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the bottlenose dolphin feature of the site from changes in available habitat	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	- supporting habitats and species; - the long-term maintenance of bottlenose dolphin population as a viable component of its natural habitat.		from the CWP Project in-combination with other projects.	

Impact 1: Increased underwater noise

323. With regards to underwater noise the Conservation Objectives state that *"The population is maintaining itself on a long-term basis as a viable component of its natural habitat"* and *"The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future"* (NRW, 2018c).

324. For auditory injury, the Project Alone assessment concluded that proposed activities at the CWP project will not cause auditory injury to bottlenose dolphins.

325. For disturbance, the Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is no potential for an impediment to the Conservation Objectives of the Cardigan Bay SAC from increased underwater noise.

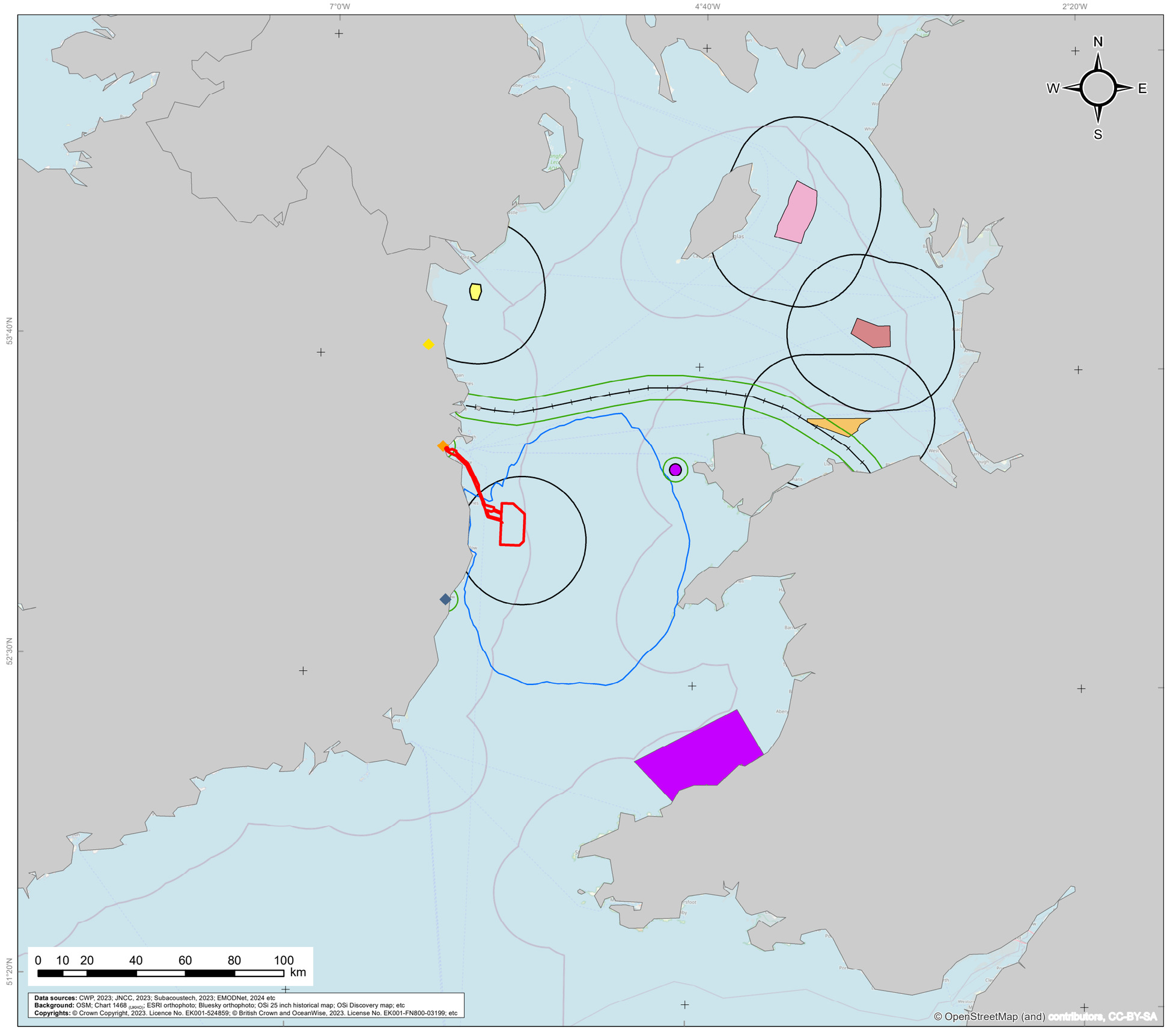
326. This in-combination assessment focuses on the potential impact of disturbance from construction activities at other offshore projects in the Irish Sea MU for bottlenose dolphins in 2027 (the same year as piling at the CWP Project). As outlined in **EIAR Chapter 11, Appendix 11.1 Cumulative effects assessment for marine mammals**, there are expected to be four other OWFs in the Irish Sea MU that will be constructing in 2027 as well as one tidal project, three coastal projects and one cable project (**Table 3-37**). As such, these offshore projects have been screened into the in-combination assessment for disturbance from underwater noise for bottlenose dolphins.

Table 3-37 Offshore projects constructing in the Irish Sea MU in 2027

Project	Tier	Type
Codling	-	OWF
Awel y Môr	1	OWF
Arklow Waste Water Treatment	1	Coastal
Maintenance dredging River Boyne, Drogheda	1	Coastal
North Wall Emergency Power Generation Plant	1	Coastal
Oriel	2b	OWF
Morecambe	2b	OWF
Isle of Man	2b	OWF
Mares Connect	3	Cable
Holyhead Deep	3	Tidal

327. To quantitatively assess the potential for disturbance to the SAC for each of the projects in-combination, a 26 km (fixed) or 15 km (floating (i.e., anchor pile installation) and / or jacket (pin) pile installation) EDR was assumed as an indicative disturbance area for each OWF project (this follows the guidance in JNCC (2020) for disturbance assessments to porpoise SACs in England, Wales and Northern Ireland where 26 km EDR is advised for monopiles and 15 km EDR is advised for pin-piles – the same is assumed for bottlenose dolphins here in the absence of species-specific guidance). Additionally, it was assumed that coastal, tidal and cable projects require no piling activities and thus disturbance effects during construction are expected to be limited to activities such as dredging, trenching, cable laying, vessel activity etc for which a maximum 5 km EDR has been assumed (as per Pirotta et al. (2013) for dredging activities).

328. None of the projects have disturbance contours that overlapped with the boundary of the Cardigan Bay SAC (**Figure 3-13**).



Legend

- Planning application boundary
- 5 km EDR
- 26 km EDR
- SEL_{ss} 145 dB re μPa^2s threshold
- North Wall Power Plant
- Arklow Waste Treatment Plant
- Dogheda Maintenance Dredge
- Holyhead Deep Tidal
- Mares Connect
- Oriel
- Awel y Mor
- Isle of Man
- Morcambe
- Cardigan Bay SAC

codling wind park

Project: Codling Wind Park

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Figure 3.13:
Disturbance thresholds for piling in combination with the 5 km and 26 km EDR from other construction projects, in relation to the Cardigan Bay SAC designated for bottlenose dolphins

CWP doc. number: CWP-SMR-ENG-08-01-MAP-1588

Internal descriptive code:
IS - PAB..DPNM.THRESH.SEL.5EDR..26EDR.CONT - ARK.WASTE.TP..AWEL..DOGHEDA.MAIN.DREDGE..HOLY.DEEP.TIDAL..ISLE.OF.MAN..MARES.CONNECT..MORCAMBE..NORTH.WALL.PP..ORIEL..CARDIGAN.BAY.SAC - (NIS.Vol.06.a.Sec.03.FIG.01)

Size: A3
Scale: 1:1,500,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
A	Final version	2024/03/07	JC	RRS/EA	JM

329. With regards ex situ and in situ effects is acknowledged that bottlenose dolphins will range outside of the SAC, and thus the potential impact to the Irish Sea MU as a whole is also relevant to consider. Assuming all projects are conducting construction activities at the same time, then up to 2,715 bottlenose dolphins in the Irish Sea MU are predicted to experience disturbance per construction day (**Table 3-28**). This equates to 32.6% of the Irish Sea MU (assuming the MU is 8,326 dolphins, as per Gilles et al. (2023)). 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 additional impact from other projects is low in comparison and is thus not expected to result in enough additional disturbance to change the population trajectory.

330. What is important to consider here is the residency of bottlenose dolphins 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. While the wider SAC population is considered to be mainly resident across the Cardigan Bay SAC and the Lleyn Peninsula and the Sarnau SAC areas, bottlenose dolphins across the wider Irish Sea MU are expected to be mainly comprised of the offshore ecotype which is considered to be more of a transient species in the area. It is therefore unlikely that individuals would remain in the impacted area over a sufficient number of consecutive days to experience a level of disturbance that could impact their vital rates. Temporary changes in behaviour and / or distribution of individuals within the Irish Sea MU 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 MU population size or trajectory.

331. Considering the above, disturbance is expected to be temporary and highly unlikely to result in any changes to the trajectory of the Irish Sea MU. Therefore, the population is expected to maintain itself on a long-term basis as a viable component of its natural habitat and the natural range of the population is not expected to be reduced. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the bottlenose dolphin feature from disturbance caused by underwater noise from the CWP Project in-combination with other projects, and no potential for AESI overall.

Table 3-38 Number of bottlenose dolphins within the Irish Sea MU predicted to be disturbed by each project in 2027

OWF	Disturbance threshold	SCANS IV block	Density (#/km^2)	# disturbed
Codling	Dose-response	CS-D	0.2352	2,060
Awel y Môr	26 km EDR	CS-E	0.0104	22
Arklow Waste Water Treatment	5 km EDR	CS-D	0.2352	18
Maintenance dredging River Boyne, Drogheda	5 km EDR	CS-D	0.2352	18
North Wall Emergency Power Generation Plant	5 km EDR	CS-D	0.2352	18
Oriel	26 km EDR	CS-D	0.2352	499
Morcambe	26 km EDR	CS-E	0.0104	22
Isle of Man	26 km EDR	CS-E	0.0104	22
Mares Connect	5 km EDR	CS-D	0.2352	18
Holyhead Deep	5 km EDR	CS-E	0.0104	18

Impact 2: Collision risk

332. With regards to collision risk the Conservation Objectives state that *"The population is maintaining itself on a long-term basis as a viable component of its natural habitat"* (NRW, 2018c). Therefore, injury or mortality from vessel collisions should not result in a change to the population size.

333. The Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is expected to be no potential for impediment to the Conservation Objectives of the Cardigan Bay SAC from collision risk.

334. Vessel activity associated with the CWP Project and other offshore projects in the Irish Sea MU will be confined to the respective project areas and vessels will follow transit routes to and from ports, in areas characterised by relatively high levels of baseline traffic. The risk of collision to bottlenose dolphins is expected to be localised to within the boundaries of the respective projects, none of which overlap with the Cardigan Bay SAC. It is assumed that all other offshore projects in the Irish Sea MU will either adopt a VMP or follow best practice codes of conduct on vessel handing around marine mammals[22] to minimise any potential effects on marine mammals and reduce risk of collision. As such, the potential for collision risk from the CWP Project in-combination with other projects is considered negligible.

335. Considering the above, no bottlenose dolphins present within the Cardigan Bay SAC or in the wider Irish Sea MU are expected to experience death or injury from vessel collisions and thus the population is expected to maintain itself on a long-term basis. There is, therefore, no potential for impediment to

[22] E.g. IWDG code of conduct (https://iwdg.ie/cms_files/wp-content/uploads/2022/06/Code-of-Conduct-When-Encountering-Whales-And-Dolphins-A3-Document.pdf), Sea Wise Code advised by NRW (https://naturalresources.wales/media/3513/sea-wise-code.pdf), South and West Wales seabird and seal code of conduct (https://www.welshwildlife.org/nature-reserves/code-conduct-seabirds-and-seals).

the Conservation Objectives of the bottlenose dolphin feature from collision risk from CWP Project in-combination with other projects, and no potential for AESI overall.

Impact 3: Changes in prey availability

336. The Conservation Objectives state that *"The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing"* (NRW, 2018c).

337. As stated in the latest feature condition assessment (NRW, 2018b) *"we do not have enough information about bottlenose dolphin prey species and the status of fish stocks to produce a meaningful assessment for this component"* (NRW, 2018b). Overall, the supporting habitat (including the prey availability and quality component) was assessed as **unknown**. This makes it unfeasible to undertake an assessment against a specific condition assessment within this NIS, however an assessment has been presented on a precautionary basis through reference to the site specific assessment on fish and shellfish (**Chapter 9 Fish, Shellfish and Turtle Ecology**).

338. The Project Alone assessment concluded that there is expected to be no potential for impediment to the Conservation Objectives of the Cardigan Bay SAC from changes in prey availability.

339. Where multiple projects may impact bottlenose dolphin fish prey species or the habitats that support the prey within the site, there is the potential for in-combination indirect effects on the bottlenose dolphin population. To inform this NIS assessment, the assessment of potential cumulative effects on fish and shellfish receptors carried out as a part of the EIAR (**Chapter 9 Fish, Shellfish and Turtle Ecology**) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to bottlenose dolphin prey species within the Cardigan Bay SAC, it does assess the broader potential for cumulative effects to these wide-ranging fish species to result from the CWP Project in combination with relevant projects, including OWF projects on the east coast of Ireland, including Arklow Bank, Dublin Array and NISA. The EIAR concluded that impacts such as temporary habitat loss or disturbance, long-term habitat loss and increased suspended sediments concentrations are expected to occur over a spatial extent which is very small relative to the wider area over which developments occur, and relative to the size of available spawning and nursery areas for fish. Therefore, these impacts are considered negligible in the context of the wider availability of suitable habitat for marine mammal prey species. In summary, the cumulative assessment for fish and shellfish does not identify any significant cumulative effects resulting from the CWP Project alongside other projects. As such, it is anticipated that during the construction phase and any maintenance / decommissioning activities at CWP and other projects, any impacts to bottlenose dolphin prey availability will be negligible.

340. Considering the above there is expected to be no long-term change to bottlenose dolphin prey species presence, abundance, condition or diversity. As such, changes in prey availability will not affect the distribution, abundance and population dynamics of bottlenose dolphins within and beyond the site. There is, therefore, no potential for impediment to the Conservation Objectives of the bottlenose dolphin feature from changes in prey availability from the CWP Project in combination with other projects, and no potential for AESI overall.

Impact 4: Changes in available habitat

341. The Conservation Objectives state that *"The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future"* (NRW, 2018c).

342. As stated in the latest feature condition assessment (NRW, 2018b) *"there is no specifically defined 'dolphin habitat'. The presence of dolphins at a location implies that the habitat is suitable but presence is largely driven by prey availability. This component has been assessed as unknown"* (NRW, 2018b). This makes it unfeasible to undertake an assessment against a specific condition assessment within this NIS, however an assessment has been presented on a precautionary basis. Prey availably is assessed separately above.

343. The Project Alone assessment concluded that there is expected to be no potential for impediment to the Conservation Objectives of the Cardigan Bay SAC from changes in available habitat.

344. While offshore projects within the Irish Sea MU have the potential to cause disturbance impacts to bottlenose dolphins, like the CWP Project alone, no activities at any project are expected to result in the permanent exclusion of bottlenose dolphins from part of their range within the Cardigan Bay SAC or in the wider MU. Any potential disturbance effects will be temporary. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the bottlenose dolphin feature from changes in available habitat from the CWP Project in-combination with other projects, and no potential for AESI overall.

3.14 North Channel SAC (UK0030399)

3.14.1 Harbour porpoise

Table 3-39 Conservation objectives for the North Channel SAC and summary of associated assessment of the CWP Project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
Range: Harbour porpoise is (i.e., remains) a viable component of the site. **Population:** There is no significant disturbance of the species. **Habitat:** The condition of supporting habitats and processes, and	Increased underwater noise:			Adverse effects on the qualifying Annex II feature (harbour porpoise) of the North Channel SAC will not occur as a result of impacts associated with the CWP Project in-combination with other Projects.
	The CWP Project has committed to implementing both a UXO MMMP and a piling MMMP. Other projects are anticipated to comply with 'industry standards' and follow the NPWS (2014) guidance. Increased underwater noise at CWP Project in-combination with other projects is not expected to: - restrict the survivability and reproductive potential of harbour porpoise using the site to the extent that could adversely affect the FCS; - lead to the exclusion of harbour porpoise from a significant proportion of the site for a significant period of time, in line	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of increased underwater noise from CWP Project in-combination with other projects.	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
the availability of prey is maintained.	with thresholds set in JNCC (2019b); and - impact the supporting habitats and processes (no impact pathway).			
	Collision risk:			
	The CWP Project has committed to implementing an EVMP. Other projects are anticipated to comply with Marine Wildlife Watching Codes. Collision risk from CWP Project in-combination with other projects is not expected to: - restrict the survivability and reproductive potential of harbour porpoise using the site to the extent that could adversely affect the FCS; - contribute to disturbance of the species (no impact pathway); and - impact the supporting habitats and processes (no impact pathway).	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of collision risk from the CWP Project in-combination with other projects.	
	Changes in prey availability:			
	Changes in prey availability from CWP Project in-combination with other projects are not expected to:	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	- restrict the survivability and reproductive potential of harbour porpoise using the site to the extent that could adversely affect the FCS; - adversely affect the maintenance of supporting habitats and processes relevant to harbour porpoises and their prey within the site; and - contribute to disturbance of the species (no impact pathway).		result of changes in prey availability from the CWP Project in-combination with other projects.	
	Changes in available habitat:			
	Changes in available habitat from CWP Project in-combination with other projects are not expected to: - restrict the survivability and reproductive potential of harbour porpoise using the site to the extent that could adversely affect the FCS; - adversely affect the maintenance of supporting habitats and processes relevant to harbour porpoises and their prey within the site; and - contribute to disturbance of the species (no impact pathway).	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of changes in available habitat from CWP Project in-combination with other projects.	

Impact 1: Increased underwater noise

345. The Conservation Objectives of relevance are to ensure that *"harbour porpoise is a viable component of the site"* (minimise the risk of injury) and to ensure that *"there is no significant disturbance of the species"*.

346. The Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is no potential for an impediment to the Conservation Objectives of the harbour porpoise associated with the North Channel SAC from increased underwater noise, either ex situ or in situ.

Assessment of the Project In-Combination

347. It is assumed that all offshore projects will put in place mitigation to reduce the risk of auditory injury (PTS) to negligible levels.

348. This assessment focuses on the potential in-combination impact of construction activities at other offshore projects in the Celtic and Irish Sea MU for porpoise in 2027 (the same year as piling at the CWP Project). As outlined in **EIAR Chapter 11, Appendix 11.1 Cumulative effects assessment for marine mammals**, there are expected to be seven other OWFs in the Celtic and Irish Sea MU that will be constructing in 2027 as well as two tidal projects, three coastal projects and one cable project (**Table 3-40**). As such, these offshore projects have been screened in to the in-combination assessment for disturbance from underwater noise for harbour porpoise.

Table 3-40 Offshore projects constructing in the Celtic and Irish Sea MU in 2027

Project	Tier	Type
Codling	-	OWF
Awel y Môr	1	OWF
Erebus Floating Wind Demo	1	Floating
White Cross	1	Floating
West Somerset Tidal Lagoon	1	Tidal
Arklow Waste Water Treatment	1	Coastal
Maintenance dredging River Boyne, Drogheda	1	Coastal
North Wall Emergency Power Generation Plant	1	Coastal
Oriel	2b	OWF
Sceirde Rocks	2a	OWF
Morecambe	2b	OWF
Isle of Man	2b	OWF
Mares Connect	3	Cable
Holyhead Deep	3	Tidal

349. To quantitatively assess the potential for disturbance to the SAC for each of the projects in-combination, a 26 km (fixed) or 15 km (floating (i.e., anchor pile installation) and / or jacket (pin) pile installation) EDR was assumed as an indicative disturbance area for each OWF project (this follows

the guidance in JNCC (2020) for disturbance assessments to porpoise SACs in England, Wales and Northern Ireland where 26 km EDR is advised for monopiles and 15 km EDR is advised for pin-piles). Additionally, it was assumed that coastal, tidal and cable projects require no piling activities and thus disturbance effects during construction are expected to be limited to activities such as dredging, trenching, cable laying, and vessel activity for which a maximum 5 km EDR has been assumed (as per (McQueen et al., 2020) for dredging activities).

350. With regards in situ effects one of the projects have disturbance contours that overlap with the North Channel SAC (**Figure 3-14**). With regards ex situ effects, the level of disturbance predicted to occur within the Celtic and Irish Sea MU between 2023 and 2028, and in particular in 2027, 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. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the SAC from an increase in underwater noise from construction activities from CWP Project in-combination with other projects, either ex situ or in situ.

351. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from disturbance from underwater noise from the CWP Project in-combination with other projects, and no potential for AESI overall.

10°0'W
6°40'W
3°20'W
54°10'N
52°0'N
49°50'N

N
W
E
S

0 10 20 40 60 80 100 km

Data sources: CWP, 2023; JNCC, 2023; Subacoustech, 2023; EMODNet, 2024 etc.
Background: OSM; Chart 1468 (UKHO); ESRI orthophoto; Bluesky orthophoto; OSi 25 inch historical map; OSi Discovery map; etc
Copyrights: © Crown Copyright, 2023. Licence No. EK001-524859; © British Crown and OceanWise, 2023. License No. EK001-FN800-03199; etc

Legend

- Planning application boundary
- 5 km EDR
- 15 km EDR
- 26 km EDR
- North Wall Power Plant
- Arklow Waste Treatment Plant
- Dogheda Maintenance Dredge
- West Somerset Lagoon Tidal
- Holyhead Deep Tidal
- Mares Connect
- Whitecross
- Sceirde Rocks
- Oriel
- Awel y Mor
- Isle of Man
- Morcambe
- Erebus (Floating)
- North Channel SAC

codling wind park

Project: Codling Wind Park

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Figure 3.14:
26 km EDR for piling in combination with the 5 km, 15 km and 26 km EDR from other construction projects, in relation to the North Channel SAC designated for harbour porpoise

CWP doc. number: CWP-SMR-ENG-08-01-MAP-1680

Internal descriptive code:
IRE - PAB..DPNM.THRESH.5EDR.15EDR.26EDR.CONT - ARK.WASTE.TP..AWEL..DOGHEDA.MAIN.DREDGE..EREBUS..HOLY.DEEP.TIDAL..ISLE.OF.MAN..MARES.CONNECT..MORCAMBE..NORTH.WALL.PP..ORIEL..SCEIRDE.ROCKS..WEST.SOMER.LAG.TIDAL..WHITECROSS..NORTH.CHANNEL.SAC - (NIS.Vol.06.a.Sec.03.FIG.13)

Size: A3
Scale: 1:2,000,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
A	Final version	2024/07/17	JC	RRS/EA	JM

Impact 2: Collision risk

352. The Conservation Objective of relevance is to ensure that *"harbour porpoise is a viable component of the site"* (minimise the risk of injury).

353. The Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is no potential for an impediment to the Conservation Objectives for harbour porpoise within the North Channel SAC from collisions with Project vessels, and no potential for AESI overall.

Assessment of the Project In-Combination

354. The risk of collision to harbour porpoise is expected to be primarily localised to within the boundaries of the respective projects. None of the boundaries of the other offshore projects overlap with the North Channel SAC. The vessel routes and potential ports used by other offshore projects are unknown, and therefore it is not possible to estimate the expected level of vessel activity within the North Channel SAC from other projects. However, it is assumed that all other offshore projects in the Celtic and Irish Sea MU will either adopt a VMP or follow best practice codes of conduct on vessel handing around marine mammals[23] to minimise any potential effects on marine mammals and reduce risk of collision. As such, the potential for collision with vessels from the CWP Project in-combination with other projects within the SAC is considered negligible.

355. No harbour porpoise within the SAC are expected to experience death or injury from vessel collisions and as such, risk of collision will not adversely affect the harbour porpoise at the site. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise from collision risk from the CWP Project in-combination with other projects, and no potential for AESI overall.

Impact 3: Changes in prey availability

356. The Conservation Objective of relevance is to ensure *"the condition of supporting habitats and processes, and the availability of prey is maintained"*.

357. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives for harbour porpoise associated with the North Channel SAC from changes in prey availability.

Assessment of the Project In-Combination

358. Where multiple projects may impact upon harbour porpoise fish prey species or the habitats that support the prey within the site, there is the potential for in-combination indirect effects on the harbour porpoise community. Therefore, projects with the potential to act in-combination with CWP are those where the spatial footprint of activities (e.g., underwater noise, seabed disturbance) may encroach upon the SAC. To inform this NIS assessment, the assessment of potential cumulative effects on fish and shellfish receptors carried out as a part of the EIAR (**Chapter 9 Fish, Shellfish and Turtle Ecology**) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to harbour porpoise prey species within the SAC, it does assess the broader potential for cumulative

[23] E.g. IWDG code of conduct (https://iwdg.ie/cms_files/wp-content/uploads/2022/06/Code-of-Conduct-When-Encountering-Whales-And-Dolphins-A3-Document.pdf), Sea Wise Code advised by NRW (https://naturalresources.wales/media/3513/sea-wise-code.pdf), South and West Wales seabird and seal code of conduct (https://www.welshwildlife.org/nature-reserves/code-conduct-seabirds-and-seals).

effects to these wide-ranging fish species to result from the CWP Project in combination with other offshore projects, including OWF projects on the east coast of Ireland, including Arklow Bank, Dublin Array and NISA. The EIAR concluded that impacts such as temporary habitat loss or disturbance, long-term habitat loss and increased suspended sediments concentrations are expected to occur over a spatial extent which is very small relative to the wider area over which developments occur, and relative to the size of available spawning and nursery areas for fish. Therefore, these impacts are considered negligible in the context of the wider availability of suitable habitat for harbour porpoise prey species. In summary, the cumulative assessment for fish and shellfish does not identify any significant cumulative effects resulting from the CWP Project alongside other projects.

Impact 4: Changes in available habitat

359. The Conservation Objective of relevance is to ensure *"the condition of supporting habitats and processes […] is maintained. Supporting habitats, in this context, means the characteristics of the seabed and water column. Processes encompass the movements and physical properties of the habitat".*

360. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives for harbour porpoise associated with the North Channel SAC from changes in available supporting habitat, and no potential for AESI overall.

Assessment of the Project In-Combination

361. To inform this NIS assessment, the assessment of potential cumulative effects on Marine Geology, Sediments and Coastal Processes carried out as a part of the EIAR (**Appendix 6.1 Marine Geology, Sediments and Coastal Processes Cumulative Effects Assessment** of the EIAR) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to the SAC, it does assess the broader potential for cumulative effects to result from CWP in combination with other offshore projects, including Dublin Array OWF, Arklow Bank Phase 2 OWF, Dublin Port MP2 project, Dublin Port maintenance dredging and Dublin Port capital dredging. No significant cumulative effects of suspended sediment concentration, sediment deposition, alteration in seabed morphology or changes to the hydrodynamic, wave and sediment regimes or coastal processes were identified. Therefore, it is assumed that there will be no significant impact to the marine geology, sediments and coastal processes within the North Channel SAC.

362. Additionally, to inform this NIS assessment, the assessment of potential cumulative effects on marine water quality carried out as a part of the EIAR (**Appendix 7.1 Marine water Quality Cumulative Effects Assessment** of the EIAR) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to the SAC, it does assess the broader potential for cumulative effects to result from CWP in combination with other offshore projects, including Arklow Bank Phase 2 OWF, Banba Wind OWF, Setanta Wind Park, Dublin Array OWF, Dublin Port dredging, Dublin Port MP2, Kilmichael Point Wind, Lir Offshore Array, Drogheda Port dredging, Mares Connect, NISA OWF etc. It was assumed that impacts at other offshore projects would be relatively similar to those at the CWP Project, and thus none of the impacts (increases in suspended sediment, resuspension of contaminated sediments or accidental pollution) across the cumulative projects resulted in a significant effect on marine water quality. Therefore, it is assumed that there will be no significant impact to the marine water quality within the North Channel SAC.

363. In summary, there is not expected to be any significant effect to the supporting habitats within the North Channel SAC from the CWP Project in combination with other projects.

3.15 Bristol Channel Approaches SAC (UK0030396)

3.15.1 Harbour porpoise

Table 3-41 Conservation objectives for the Bristol Channel Approaches SAC and summary of associated assessment of the CWP Project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
Range: Harbour porpoise is (i.e., remains) a viable component of the site. **Population:** There is no significant disturbance of the species. **Habitat:** The condition of supporting habitats and processes, and	Increased underwater noise:			Adverse effects on the qualifying Annex II feature (harbour porpoise) of the Bristol Channel Approaches SAC will not occur as a result of impacts associated with the CWP Project in-combination with other Projects.
	The CWP Project has committed to implementing both a UXO MMMP and a piling MMMP. Other projects are anticipated to comply with 'industry standards' and follow the NPWS (2014) guidance. Increased underwater noise at the CWP Project in-combination with other projects is not expected to: - restrict the survivability and reproductive potential of harbour porpoise using the site to the extent that could adversely affect the FCS; - lead to the exclusion of harbour porpoise from a significant proportion of the site for a significant period of time, in line	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of increased underwater noise from the CWP Project in-combination with other projects.	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
the availability of prey is maintained.	with thresholds set in JNCC (2019); and - impact the supporting habitats and processes (no impact pathway).			
	Collision risk:			
	The CWP Project has committed to implementing an EVMP. Other projects are anticipated to comply with Marine Wildlife Watching Codes. Collision risk from the CWP Project in-combination with other projects is not expected to: - restrict the survivability and reproductive potential of harbour porpoise using the site to the extent that could adversely affect the FCS; - contribute to disturbance of the species (no impact pathway); and - impact the supporting habitats and processes (no impact pathway).	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of collision risk from the CWP Project in-combination with other projects.	
	Changes in prey availability:			
	Changes in prey availability from the CWP Project in-combination with other projects are not expected to:	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	- restrict the survivability and reproductive potential of harbour porpoise using the site to the extent that could adversely affect the FCS; - adversely affect the maintenance of supporting habitats and processes relevant to harbour porpoises and their prey within the site; and - contribute to disturbance of the species (no impact pathway).		result of changes in prey availability from the CWP Project in-combination with other projects.	
	Changes in available habitat:			
	Changes in available habitat from the CWP Project in-combination with other projects are not expected to: - restrict the survivability and reproductive potential of harbour porpoise using the site to the extent that could adversely affect the FCS; - adversely affect the maintenance of supporting habitats and processes relevant to harbour porpoises and their prey within the site; and - contribute to disturbance of the species (no impact pathway).	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of changes in available habitat from the CWP Project in-combination with other projects.	

Impact 1: Increased underwater noise

364. The Conservation Objectives of relevance are to ensure that *"harbour porpoise is a viable component of the site"* (minimise the risk of injury) and to ensure that *"there is no significant disturbance of the species"*.

365. The Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is no potential for an impediment to the Conservation Objectives of the harbour porpoise associated with the Bristol Channel Approaches SAC from increased underwater noise, either ex situ or in situ.

Assessment of the Project In-Combination

366. It is assumed that all offshore projects will put in place mitigation to reduce the risk of auditory injury (PTS) to negligible levels.

367. This assessment focuses on the potential in-combination impact of construction activities at other offshore projects in the Celtic and Irish Sea MU for porpoise in 2027 (the same year as piling at the CWP Project). As outlined in **EIAR Chapter 11, Appendix 11.1 Cumulative effects assessment for marine mammals**, there are expected to be seven other OWFs in the Celtic and Irish Sea MU that will be constructing in 2027 as well as two tidal projects, three coastal projects and one cable project (**Table 3-42**). As such, these offshore projects have been screened in to the in-combination assessment for disturbance from underwater noise for harbour porpoise.

Table 3-42 Offshore projects constructing in the Celtic and Irish Sea MU in 2027.

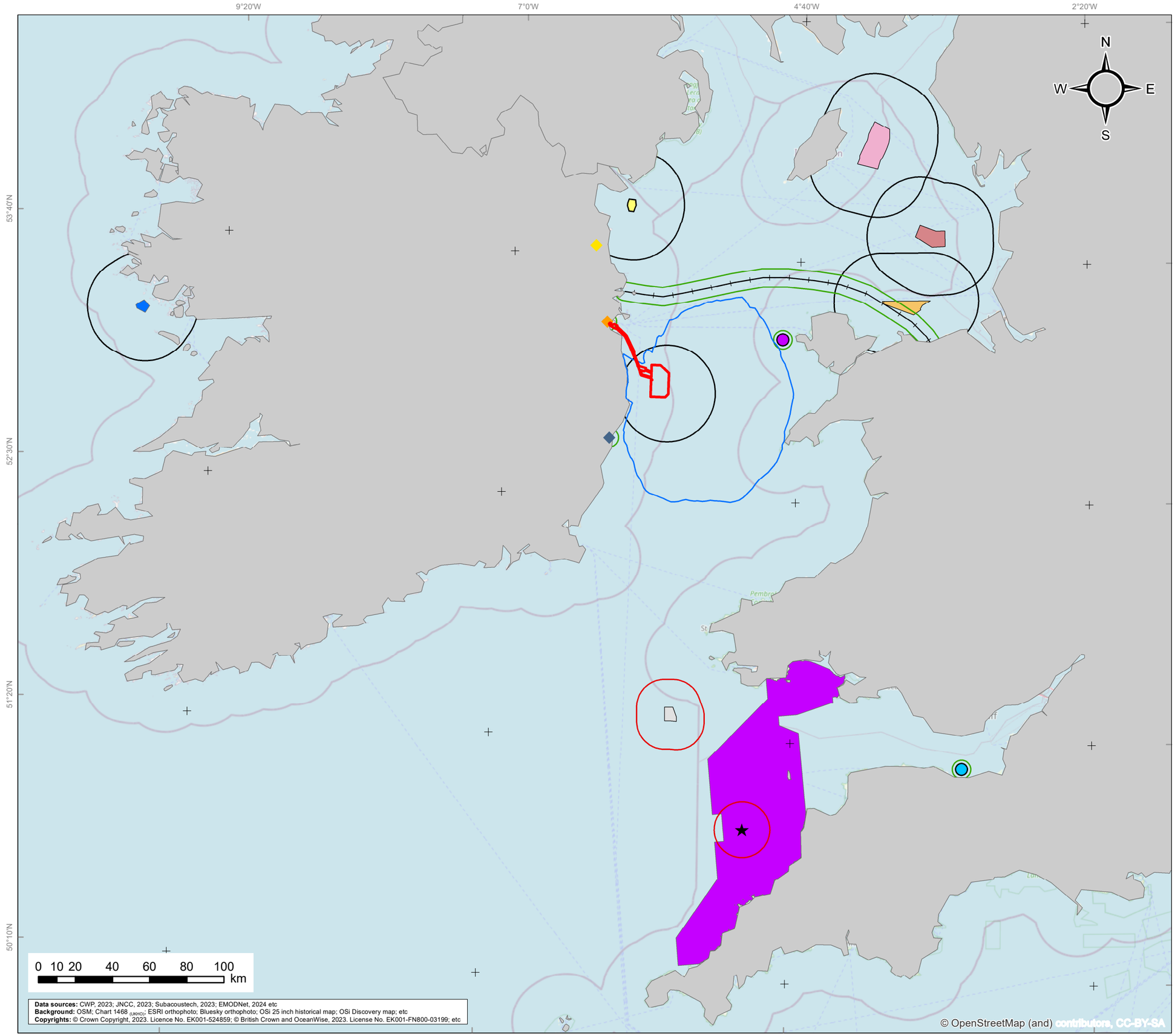
Project	Tier	Type
Codling	-	OWF
Awel y Môr	1	OWF
Erebus Floating Wind Demo	1	Floating
White Cross	1	Floating
West Somerset Tidal Lagoon	1	Tidal
Arklow Waste Water Treatment	1	Coastal
Maintenance dredging River Boyne, Drogheda	1	Coastal
North Wall Emergency Power Generation Plant	1	Coastal
Oriel	2b	OWF
Sceirde Rocks	2a	OWF
Morecambe	2b	OWF
Isle of Man	2b	OWF
Mares Connect	3	Cable
Holyhead Deep	3	Tidal

368. To quantitatively assess the potential for disturbance to the SAC for each of the projects in-combination, a 26 km (fixed) or 15 km (floating (i.e., anchor pile installation) and / or jacket (pin) pile

installation) EDR was assumed as an indicative disturbance area for each OWF project (this follows the guidance in JNCC (2020) for disturbance assessments to porpoise SACs in England, Wales and Northern Ireland where 26 km EDR is advised for monopiles and 15 km EDR is advised for pin-piles). Additionally, it was assumed that coastal, tidal and cable projects require no piling activities and thus disturbance effects during construction are expected to be limited to activities such as dredging, trenching, cable laying, and vessel activity for which a maximum 5 km EDR has been assumed (as per (McQueen et al., 2020) for dredging activities).

369. With regards in situ effects the White Cross floating OWF is the only project to have disturbance contours that overlap with the boundary of the Bristol Channel Approaches SAC (**Figure 3-15**). There is no contribution from the CWP project to the noise disturbance thresholds for the SAC. With regards ex situ effects, the level of disturbance predicted to occur within the Celtic and Irish Sea MU between 2023 and 2028, and in particular in 2027, 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. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the SAC from an increase in underwater noise from construction activities from CWP Project in-combination with other projects, either ex situ or in situ.

370. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from disturbance from underwater noise from the CWP Project in-combination with other projects, and no potential for AESI overall.



Legend

- Planning application boundary
- SEL_{ss} 145 dB re µPa²s threshold
- 5 km EDR
- 15 km EDR
- 26 km EDR
- North Wall Power Plant
- Arklow Waste Treatment Plant
- Dogheda Maintenance Dredge
- Mares Connect
- West Somerset Lagoon Tidal
- Holyhead Deep Tidal
- Whitecross
- Oriel
- Awel y Mor
- Sceirde Rocks
- Isle of Man
- Morcambe
- Erebus (Floating)
- Bristol Channel Approaches SAC

codling wind park

Project: Codling Wind Park

SMRU Consulting
understand • assess • mitigate

Figure 3.15:
Disturbance thresholds for piling in combination with the 5 km, 15 km and 26 km EDR from other construction projects, in relation to the Bristol Channel Approaches SAC designated for harbour porpoise

CWP doc. number: CWP-SMR-ENG-08-01-MAP-1672

Internal descriptive code:
IRE - PAB..DPNM.THRESH.SEL.SEDR.15EDR.26EDR.CONT - ARK.WASTE.TP..AWEL..DOGHEDA.MAIN.DREDGE..EREBUS..HOLY.DEEP.TIDAL..ISLE.OF.MAN..MARES.CONNECT..MORCAMBE..NORTH.WALL.PP..ORIEL..SCEIRDE.ROCKS..WEST.SOMER.LAG.TIDAL..WHITECROSS..BRISTOL.CHANNEL.APPROACH.SAC - (WS Vol.06.a.Sec.03.FIG.05)

Size: A3
Scale: 1:2,000,000

CRS: EPSG 25830

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
A	Final version	2024/07/17	JC	RRS/EA	JM

Impact 2: Collision risk

371. The Conservation Objective of relevance is to ensure that *"harbour porpoise is a viable component of the site"* (minimise the risk of injury).

372. The Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is no potential for an impediment to the Conservation Objectives for harbour porpoise within the Bristol Channel Approaches SAC from collisions with Project vessels.

Assessment of the Project In-Combination

373. The risk of collision to harbour porpoise is expected to be primarily localised to within the boundaries of the respective projects. With the exception of the White Cross floating OWF project, none of the boundaries of the other offshore projects overlap with the Bristol Channel Approaches SAC. The vessel routes and potential ports used by other offshore projects are unknown, and therefore it is not possible to estimate the expected level of vessel activity within the Bristol Channel Approaches SAC from other projects. However, it is assumed that all other offshore projects in the Celtic and Irish Sea MU will either adopt a VMP or follow best practice codes of conduct on vessel handing around marine mammals[24] to minimise any potential effects on marine mammals and reduce risk of collision. As such, the potential for collision with vessels from the CWP Project in-combination with other projects within the SAC is considered negligible.

374. No harbour porpoise within the SAC are expected to experience death or injury from vessel collisions and as such, risk of collision will not adversely affect the harbour porpoise at the site. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise from collision risk from the CWP Project in-combination with other projects, and no potential for AESI overall.

Impact 3: Changes in prey availability

375. The Conservation Objective of relevance is to ensure *"the condition of supporting habitats and processes, and the availability of prey is maintained"*.

376. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives for harbour porpoise associated with the Bristol Channel Approaches SAC from changes in prey availability.

Assessment of the Project In-Combination

377. Where multiple projects may impact upon harbour porpoise fish prey species or the habitats that support the prey within the site, there is the potential for in-combination indirect effects on the harbour porpoise community. Therefore, projects with the potential to act in-combination with CWP are those where the spatial footprint of activities (e.g., underwater noise, seabed disturbance) may encroach upon the SAC. To inform this NIS assessment, the assessment of potential cumulative effects on fish and shellfish receptors carried out as a part of the EIAR (**Chapter 9 Fish, Shellfish and Turtle Ecology**) was referred to. While the EIAR cumulative assessment does not specifically assess impacts

[24] E.g. IWDG code of conduct (https://iwdg.ie/cms_files/wp-content/uploads/2022/06/Code-of-Conduct-When-Encountering-Whales-And-Dolphins-A3-Document.pdf), Sea Wise Code advised by NRW (https://naturalresources.wales/media/3513/sea-wise-code.pdf), South and West Wales seabird and seal code of conduct (https://www.welshwildlife.org/nature-reserves/code-conduct-seabirds-and-seals).

to harbour porpoise prey species within the SAC, it does assess the broader potential for cumulative effects to these wide-ranging fish species to result from the CWP Project in combination with other offshore projects, including OWF projects on the east coast of Ireland, including Arklow Bank, Dublin Array and NISA. The EIAR concluded that impacts such as temporary habitat loss or disturbance, long-term habitat loss and increased suspended sediments concentrations are expected to occur over a spatial extent which is very small relative to the wider area over which developments occur, and relative to the size of available spawning and nursery areas for fish. Therefore, these impacts are considered negligible in the context of the wider availability of suitable habitat for harbour porpoise prey species. In summary, the cumulative assessment for fish and shellfish does not identify any significant cumulative effects resulting from the CWP Project alongside other projects.

Impact 4: Changes in available habitat

378. The Conservation Objective of relevance is to ensure *"the condition of supporting habitats and processes […] is maintained. Supporting habitats, in this context, means the characteristics of the seabed and water column. Processes encompass the movements and physical properties of the habitat".*

379. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives for harbour porpoise associated with the Bristol Channel Approaches SAC from changes in available supporting habitat.

Assessment of the Project In-Combination

380. To inform this NIS assessment, the assessment of potential cumulative effects on Marine Geology, Sediments and Coastal Processes carried out as a part of the EIAR (**Appendix 6.1 Marine Geology, Sediments and Coastal Processes Cumulative Effects Assessment** of the EIAR) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to the SAC, it does assess the broader potential for cumulative effects to result from CWP in combination with other offshore projects, including Dublin Array OWF, Arklow Bank Phase 2 OWF, Dublin Port MP2 project, Dublin Port maintenance dredging and Dublin Port capital dredging. No significant cumulative effects of suspended sediment concentration, sediment deposition, alteration in seabed morphology or changes to the hydrodynamic, wave and sediment regimes or coastal processes were identified. Therefore, it is assumed that there will be no significant impact to the marine geology, sediments and coastal processes within the Bristol Channel Approaches SAC.

381. Additionally, to inform this NIS assessment, the assessment of potential cumulative effects on marine water quality carried out as a part of the EIAR (**Appendix 7.1 Marine Water Quality Cumulative Effects Assessment** of the EIAR) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to the SAC, it does assess the broader potential for cumulative effects to result from CWP in combination with other offshore projects, including Arklow Bank Phase 2 OWF, Banba Wind OWF, Setanta Wind Park, Dublin Array OWF, Dublin Port dredging, Dublin Port MP2, Kilmichael Point Wind, Lir Offshore Array, Drogheda Port dredging, Mares Connect, NISA OWF etc. It was assumed that impacts at other offshore projects would be relatively similar to those at the CWP Project, and thus none of the impacts (increases in suspended sediment, resuspension of contaminated sediments or accidental pollution) across the cumulative projects resulted in a significant effect on marine water quality. Therefore, it is assumed that there will be no significant impact to the marine water quality within the Bristol Channel Approaches SAC.

382. In summary, there is not expected to be any significant effect to the supporting habitats within the Bristol Channel Approaches SAC from the CWP Project in combination with other projects.

3.16 Roaringwater Bay and Islands SAC (IE000101)

3.16.1 Harbour porpoise

Table 3-43 Conservation objectives for the Roaringwater Bay and Islands SAC and summary of associated assessment of the CWP Project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
Range: Species range within the site should not be restricted by artificial barriers to site use. **Population:** Human activities should occur at levels that do not adversely affect the harbour porpoise population at the site.	Increased underwater noise:			Adverse effects on the qualifying Annex II feature (harbour porpoise) of the Roaringwater Bay and Islands SAC will not occur as a result of impacts associated with the CWP Project in-combination with other projects.
	The CWP Project has committed to implementing both a UXO MMMP and a piling MMMP. Increased underwater noise from the CWP Project in combination with other projects is not expected to result in the permanent exclusion of harbour porpoise from part of its range within the site and will not permanently prevent access for the species to suitable habitat.	No additional mitigation is required.	There is no potential for an AEoI associated with maintaining the species (harbour porpoise) range due to increased underwater noise from the CWP Project in-combination with other projects.	
	Collision risk:			
	The CWP Project has committed to implementing an EVMP. Other projects are anticipated to comply with Marine Wildlife Watching Codes. Collision risk from the CWP	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of collision risk from the	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	Project in-combination with other projects is not expected to: - result in the permanent exclusion of harbour porpoise from part of its range within the site and permanently prevent access for the species to suitable habitat; and - adversely affect the harbour porpoise population at the site.		CWP Project in-combination with other projects.	
	Changes in prey availability:			
	Changes in prey availability from the CWP Project in-combination with other projects will not cause barriers to site use and are not expected to adversely affect the harbour porpoise population at the site.	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the site from changes in prey availability from the CWP Project in-combination with other projects.	
	Changes in available habitat:			
	Changes in available habitat from CWP Project in-combination with other projects are not expected to: - result in the permanent exclusion of harbour porpoise from part of its	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the site from changes in available habitat from the CWP Project in-combination with other projects.	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	range within the site and permanently prevent access for the species to suitable habitat; and - adversely affect the harbour porpoise population at the site.			

Increased underwater noise

383. Target 2 of the Conservation Objectives states that *"proposed activities or operations should not introduce man-made energy (e.g. aerial or underwater noise, light or thermal energy) at levels that could result in a significant negative impact on individuals and / or the population of harbour porpoise within the site"*.

384. The Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with the Roaringwater Bay and Islands SAC from increased underwater noise, either ex situ or in situ.

Assessment of the Project In-Combination

385. This assessment focuses on the potential in-combination impact of construction activities at other offshore projects in the Celtic and Irish Sea MU for porpoise in 2027 (the same year as piling at the CWP project). As outlined in **EIAR Chapter 11, Appendix 11.1 Cumulative effects assessment for marine mammals**, there are expected to be seven other OWFs in the Celtic and Irish Sea MU that will be constructing in 2027 as well as two tidal projects, three coastal projects and one cable project (**Table 3-44**). As such, these offshore projects have been screened into the in-combination assessment for disturbance from underwater noise for harbour porpoise.

Table 3-44 Offshore projects constructing in the Celtic and Irish Sea MU in 2027

Project	Tier	Type
Codling	-	OWF
Awel y Môr	1	OWF
Erebus (floating)	1	Floating
White Cross	1	Floating
West Somerset Tidal Lagoon	1	Tidal
Arklow Waste Water Treatment	1	Coastal
Maintenance dredging River Boyne, Drogheda	1	Coastal
North Wall Emergency Power Generation Plant	1	Coastal
Oriel	2b	OWF
Sceirde Rocks	2a	OWF
Morecambe	2b	OWF
Isle of Man	2b	OWF
Mares Connect	3	Cable
Holyhead Deep	3	Tidal

386. To quantitatively assess the potential for disturbance to the SAC for each of the projects in-combination, a 26 km (fixed) or 15 km (floating (i.e., anchor pile installation) and / or jacket (pin) pile installation) EDR was assumed as an indicative disturbance area for each OWF project (this follows the guidance in JNCC (2020) for disturbance assessments to porpoise SACs in England, Wales and

Northern Ireland where 26 km EDR is advised for monopiles and 15 km EDR is advised for pin-piles). Additionally, it was assumed that coastal, tidal and cable projects require no piling activities and thus disturbance effects during construction are expected to be limited to activities such as dredging, trenching, cable laying, vessel activity etc for which a maximum 5 km EDR has been assumed (as per (McQueen et al., 2020) for dredging activities).

387. With regards in situ effects none of the projects had disturbance impact ranges that overlapped with the boundary of the Roaringwater Bay and Islands SAC (**Figure 3-16**). With regards ex situ effects, the level of disturbance predicted to occur within the Celtic and Irish Sea MU between 2023 and 2028, and in particular in 2027, 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. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the SAC from an increase in underwater noise from construction activities from CWP Project in-combination with other projects, either ex situ or in situ.

388. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from disturbance from underwater noise from the CWP Project in-combination with other projects, and no potential for AESI overall.

10°0'W
6°40'W
3°20'W
54°10'N
52°0'N
N
W
E
S
0 10 20 40 60 80 100 km
Data sources: CWP, 2023; NPWS, 2024; Subacoustech, 2023; EMODNet, 2024 etc
Background: OSM; Chart 1468 (UKHO); ESRI orthophoto; Bluesky orthophoto; OSi 25 inch historical map; OSi Discovery map; etc
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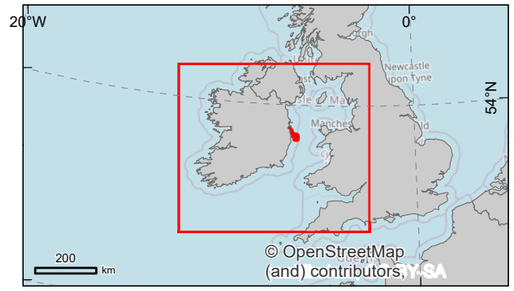


Legend

- Planning application boundary
- 5 km EDR
- 15 km EDR
- 26 km EDR
- North Wall Power Plant
- Arklow Waste Treatment Plant
- Dogheda Maintenance Dredge
- Mares Connect
- Holyhead Deep Tidal
- West Somerset Lagoon Tidal
- Whitecross
- Sceirde Rocks
- Oriel
- Awel y Mor
- Isle of Man
- Morcambe
- Erebus (Floating)
- Roaringwater and Bay Islands SAC

	Project: Codling Wind Park	SMRU Consulting understand • assess • mitigate

Figure 3.16:
26 km EDR for piling in combination with the 5 km, 15 km and 26 km EDR from other construction projects, in relation to the Roaringwater Bay and Islands SAC designated for harbour porpoise

CWP doc. number: CWP-SMR-ENG-08-01-MAP-1681

Internal descriptive code: IRE - PAB_DPNM.THRESH.5EDR.15EDR.26EDR.CONT - ARK.WASTE.TP..AWEL. DOGHEDA.MAIN.DREDGE..EREBUS..HOLY.DEEP.TIDAL..ISLE.OF.MAN..MARES. CONNECT..MORCAMBE..NORTH.WALL.PP..ORIEL..SCEIRDE.ROCKS..WEST. SOMER.LAG.TIDAL..WHITECROSS..ROARINGWATER.BAY.and.ISL.SAC - (NIS.Vol.06.a.Sec.03.FIG.14)

Size: A3
Scale: 1:2,000,000

CRS: EPSG 25830

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
A	Final version	2024/07/17	JC	RRS/EA	JM

Vessel collision

389. Target 2 of the Conservation Objectives states that *"proposed activities or operations should not cause death or injury to individuals to an extent that may ultimately affect the harbour porpoise population at the site"*.

390. The Project alone assessment concluded that, giving consideration to primary mitigation measures, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from collision risk, either ex situ or in situ.

Assessment of the Project In-Combination

391. The risk of collision to marine mammals is expected to be primarily localised to within the boundaries of the respective projects. None of the project boundaries overlap with the SAC. The vessel routes and potential ports used by other offshore projects are unknown, and therefore it is not possible to estimate the expected level of vessel activity within the Roaringwater Bay and Islands SAC from other projects. However, it is assumed that all other offshore projects in the Celtic and Irish Sea MU will either adopt a VMP or follow best practice codes of conduct on vessel handing around marine mammals[25] to minimise any potential effects on marine mammals and reduce risk of collision. As such, the potential for collision risk from CWP Project in-combination with other projects is considered negligible.

392. No harbour porpoise within the SAC are expected to experience death or injury from vessel collisions and as such, risk of collision will not adversely affect the harbour porpoise community at the site. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from collision risk from the CWP Project in-combination with other projects, and no potential for AESI overall.

Changes in prey availability

393. Target 2 of the Conservation Objectives states that "*Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site. This target also relates to proposed activities or operations that may result in the deterioration of key resources (e.g. water quality, feeding, etc.) upon which harbour porpoise depend*".

394. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with the Roaringwater Bay and Islands SAC from changes in prey availability, either ex situ or in situ.

Assessment of the Project In-Combination

395. Where multiple projects may impact upon harbour porpoise fish prey species or the habitats that support the prey within the site, there is the potential for in-combination indirect effects on the harbour porpoise community. Therefore, projects with the potential to act in-combination with CWP are those where the spatial footprint of activities (e.g., underwater noise, seabed disturbance) may encroach upon the SAC. This restricts relevant projects to the Dublin Array and NISA OWFs, which lie adjacent

[25] E.g. IWDG code of conduct (https://iwdg.ie/cms_files/wp-content/uploads/2022/06/Code-of-Conduct-When-Encountering-Whales-And-Dolphins-A3-Document.pdf), Sea Wise Code advised by NRW (https://naturalresources.wales/media/3513/sea-wise-code.pdf), South and West Wales seabird and seal code of conduct (https://www.welshwildlife.org/nature-reserves/code-conduct-seabirds-and-seals).

to the site. Given the comparable nature of these projects to CWP, it is likely that their potential for impacts to prey availability on the site is similar to that from CWP.

396. To inform this NIS, **Chapter 9 Fish, Shellfish and Turtle Ecology** of the EIAR prepared for the Project was referred to. The EIAR concludes that there will be no significant impact to any fish species from any impact pathway during the construction, operation or decommissioning of the CWP Project alone (this includes direct damage, disturbance, increased suspended sediment concentration (SSC) and sediment deposition, release of seabed contaminants, underwater noise etc.).

397. Considering the conclusions for the Project Alone assessment, the potential for CWP to provide a non-negligible contribution to in-combination effects on prey availability alongside other projects is considered to be remote. To inform this NIS assessment, the assessment of potential cumulative effects on fish and shellfish receptors carried out as a part of the EIAR (**Chapter 9 Fish, Shellfish and Turtle Ecology**) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to harbour porpoise prey species within the SAC, it does assess the broader potential for cumulative effects to these wide-ranging fish species to result from CWP in combination with relevant projects, including OWF projects on the east coast of Ireland, including Arklow Bank, Dublin Array and NISA. The EIAR concluded that impacts such as temporary habitat loss or disturbance, long-term habitat loss and increased suspended sediments concentrations are expected to occur over a spatial extent which is very small relative to the wider area over which developments occur, and relative to the size of available spawning and nursery areas for fish. Therefore, these impacts are considered negligible in the context of the wider availability of suitable habitat for marine mammal prey species. In summary, the cumulative assessment for fish and shellfish does not identify any significant cumulative effects resulting from the CWP Project alongside other projects. As such, it is anticipated that during the construction phase and any maintenance / decommissioning activities at CWP and other projects, any impacts to harbour porpoise prey availability will be negligible.

398. Considering the above, there is expected to be no long-term change to harbour porpoise prey species presence, abundance, condition or diversity; as such, there will be no deterioration of key resources (feeding) upon which harbour porpoises depend. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise community from changes in prey availability from the CWP Project in-combination with other projects, and no potential for AESI overall.

Changes in available habitat

399. Target 1 of the Conservation Objectives states that *"Species range within the site should not be restricted by artificial barriers to site use. This target may be considered relevant to proposed activities or operations that will result in the permanent exclusion of harbour porpoise from part of its range within the site or will permanently prevent access for the species to suitable habitat therein"*.

400. To recap, the Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with Roaringwater Bay and Islands SAC from changes in available habitat, either ex situ or in situ.

Assessment of the Project In-Combination

401. While offshore projects within the Celtic and Irish Sea MU have the potential to cause disturbance impacts to harbour porpoise, like CWP Project alone, the behavioural effects will be short-lived, and animals are expected to return to baseline activities following the cessation of activities. As such, no activities at any project are expected to result in the permanent exclusion of harbour porpoise from part of their range within the Roaringwater Bay and Islands SAC.

402. Considering the above, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from changes in available habitat from the CWP Project in-combination with other projects, and no potential for AESI overall.

3.17 Irish West Coast SACs

3.17.1 Harbour porpoise

Table 3-45 Conservation objectives for the Irish West Coast SAC and summary of associated assessment of the CWP Project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
Range: Species range within the site should not be restricted by artificial barriers to site use. **Population:** Human activities should occur at levels that do not adversely affect the harbour porpoise population at the site.	Increased underwater noise:			Adverse effects on the qualifying Annex II feature (harbour porpoise) of the Irish West Coast SACs will not occur as a result of impacts associated with the CWP Project in-combination with other projects.
	The CWP Project has committed to implementing both a UXO MMMP and a piling MMMP. Increased underwater noise from the CWP Project in combination with other projects is not expected to result in the permanent exclusion of harbour porpoise from part of its range within the site and will not permanently prevent access for the species to suitable habitat.	No additional mitigation is required.	There is no potential for an AEoI associated with maintaining the species (harbour porpoise) range due to increased underwater noise from the CWP Project in-combination with other projects.	
	Collision risk:			
	The CWP Project has committed to implementing an EVMP. Other projects are anticipated to comply with Marine Wildlife Watching Codes. Collision risk from the CWP	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of collision risk from the	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	Project in-combination with other projects is not expected to: - result in the permanent exclusion of harbour porpoise from part of its range within the site and permanently prevent access for the species to suitable habitat; and - adversely affect the harbour porpoise population at the site.		CWP Project in-combination with other projects.	
	Changes in prey availability:			
	Changes in prey availability from the CWP Project in-combination with other projects will not cause barriers to site use and are not expected to adversely affect the harbour porpoise population at the site.	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the site from changes in prey availability from the CWP Project in-combination with other projects.	
	Changes in available habitat:			
	Changes in available habitat from CWP Project in-combination with other projects are not expected to: - result in the permanent exclusion of harbour porpoise from part of its	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the site from changes in available habitat from the CWP Project in-combination with other projects.	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	range within the site and permanently prevent access for the species to suitable habitat; and - adversely affect the harbour porpoise population at the site.			

Increased underwater noise

403. Target 2 of the Conservation Objectives states that *"proposed activities or operations should not introduce man-made energy (e.g. aerial or underwater noise, light or thermal energy) at levels that could result in a significant negative impact on individuals and / or the population of harbour porpoise within the site"*.

404. The Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with any of the Irish West Coast SACs from increased underwater noise, either ex situ or in situ.

Assessment of the Project In-Combination

405. This assessment focuses on the potential in-combination impact of construction activities at other offshore projects in the Celtic and Irish Sea MU for porpoise in 2027 (the same year as piling at the CWP project). As outlined in **EIAR Chapter 11, Appendix 11.1 Cumulative effects assessment for marine mammals**, there are expected to be seven other OWFs in the Celtic and Irish Sea MU that will be constructing in 2027 as well as two tidal projects, three coastal projects and one cable project (**Table 3-46**). As such, these offshore projects have been screened into the in-combination assessment for disturbance from underwater noise for harbour porpoise.

Table 3-46 Offshore projects constructing in the Celtic and Irish Sea MU in 2027

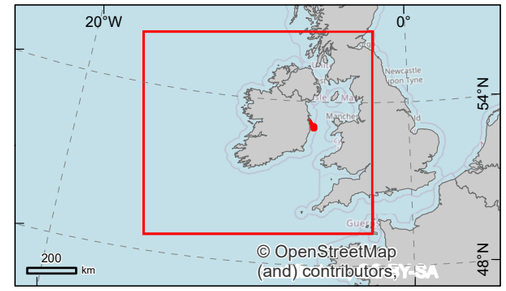
Project	Tier	Type
Codling	-	OWF
Awel y Môr	1	OWF
Erebus Floating Wind Demo	1	Floating
White Cross	1	Floating
West Somerset Tidal Lagoon	1	Tidal
Arklow Waste Water Treatment	1	Coastal
Maintenance dredging River Boyne, Drogheda	1	Coastal
North Wall Emergency Power Generation Plant	1	Coastal
Oriel	2b	OWF
Sceirde Rocks	2a	OWF
Morecambe	2b	OWF
Isle of Man	2b	OWF
Mares Connect	3	Cable
Holyhead Deep	3	Tidal

406. To quantitatively assess the potential for disturbance to the SAC for each of the projects in-combination, a 26 km (fixed) or 15 km (floating (i.e., anchor pile installation) and / or jacket (pin) pile installation) EDR was assumed as an indicative disturbance area for each OWF project (this follows the guidance in JNCC (2020) for disturbance assessments to porpoise SACs in England, Wales and

Northern Ireland where 26 km EDR is advised for monopiles and 15 km EDR is advised for pin-piles). Additionally, it was assumed that coastal, tidal and cable projects require no piling activities and thus disturbance effects during construction are expected to be limited to activities such as dredging, trenching, cable laying, vessel activity etc for which a maximum 5 km EDR has been assumed (as per (McQueen et al., 2020) for dredging activities).

407. With regards in situ effects the Sceirde Rocks OWF has disturbance impact ranges that overlap with the West Connacht Coast SAC, the Kilkeiren Bay and Islands SAC and the Inishmore Islands SAC. None of the other projects have disturbance impact ranges that overlap with any of the Irish West Coast SACs (**Figure 3-17**). With regards ex situ effects, the level of disturbance predicted to occur within the Celtic and Irish Sea MU between 2023 and 2028, and in particular in 2027, 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. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the SAC from an increase in underwater noise from construction activities from CWP Project in-combination with other projects, either ex situ or in situ.

408. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community from disturbance from underwater noise from the CWP Project in-combination with other projects, and no potential for AESI overall for the Irish West Coast SACs.

13°0'W
8°40'W
4°20'W
54°10'N
52°0'N
49°50'N
N
W
E
S
0 10 20 40 60 80 100
km


Legend

- Planning application boundary
- 5 km EDR
- 15 km EDR
- 26 km EDR
- North Wall Power Plant
- Arklow Waste Treatment Plant
- Dogheda Maintenance Dredge
- Mares Connect
- Holyhead Deep Tidal
- West Somerset Lagoon Tidal
- Whitecross
- Sceirde Rocks
- Oriel
- Awel y Mor
- Isle of Man
- Morcambe
- Erebus (Floating)
- West Connacht Coast SAC
- Belgica Mound Province SAC
- Kenmare River SAC
- Inishmore Island SAC
- Kilkeiran Bay and Islands SAC
- Porcupine Bank Canyon SAC
- South-West Porcupine Bank SAC

codling wind park

Project: Codling Wind Park

SMRU Consulting
understand • assess • mitigate

Figure 3.17:
26 km EDR for piling in combination with the 5 km, 15 km and 26 km EDR from other construction projects, in relation to the Irish West Coast SACs designated for harbour porpoise

CWP doc. number: CWP-SMR-ENG-08-01-MAP-1683

Internal descriptive code:
IRE - PAB..DPNM.THRESH.5EDR.15EDR.26EDR.CONT - ARK.WASTE.TP..AWEL..DOGHEDA.MAIN.DREDGE..EREBUS..HOLY.DEEPTIDAL..ISLE.OF.MAN..MARES.CONNECT..MORCAMBE..NORTH.WALL.PP..ORIEL..SCEIRDE.ROCKS..WEST.SOMER.LAG.TIDAL..WHITECROSS..WEST.IRISH.SACs - (NIS.Vol.06.a.Sec.03.FIG.16)

Size: A3
Scale: 1:3,000,000

CRS: EPSG 25830

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
A	Final version	2024/07/17	JC	RRS/EA	JM

Vessel collision

409. Target 2 of the Conservation Objectives states that *"proposed activities or operations should not cause death or injury to individuals to an extent that may ultimately affect the harbour porpoise population at the site"*.

410. The Project alone assessment concluded that, giving consideration to primary mitigation measures, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community at any of the Irish West Coast SACs from collision risk, either ex situ or in situ.

Assessment of the Project In-Combination

411. The risk of collision to marine mammals is expected to be primarily localised to within the boundaries of the respective projects. None of the project boundaries overlap with any of the Irish West Coast SACs. The vessel routes and potential ports used by other offshore projects are unknown, and therefore it is not possible to estimate the expected level of vessel activity within any of the Irish West Coast SACs from other projects. However, it is assumed that all other offshore projects in the Celtic and Irish Sea MU will either adopt a VMP or follow best practice codes of conduct on vessel handing around marine mammals[26] to minimise any potential effects on marine mammals and reduce risk of collision. As such, the potential for collision risk from CWP Project in-combination with other projects is considered negligible.

412. No harbour porpoise within the SAC are expected to experience death or injury from vessel collisions and as such, risk of collision will not adversely affect the harbour porpoise community at any of the Irish West Coast SACs. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community at any of the Irish West Coast SACs from collision risk from the CWP Project in-combination with other projects, and no potential for AESI overall.

Changes in prey availability

413. Target 2 of the Conservation Objectives states that "*Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site. This target also relates to proposed activities or operations that may result in the deterioration of key resources (e.g. water quality, feeding, etc.) upon which harbour porpoise depend*".

414. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with any of the Irish West Coast SACs from changes in prey availability, either ex situ or in situ.

Assessment of the Project In-Combination

415. Where multiple projects may impact upon harbour porpoise fish prey species or the habitats that support the prey within the site, there is the potential for in-combination indirect effects on the harbour porpoise community. Therefore, projects with the potential to act in-combination with CWP are those where the spatial footprint of activities (e.g., underwater noise, seabed disturbance) may encroach upon the SAC.

[26] E.g. IWDG code of conduct (https://iwdg.ie/cms_files/wp-content/uploads/2022/06/Code-of-Conduct-When-Encountering-Whales-And-Dolphins-A3-Document.pdf), Sea Wise Code advised by NRW (https://naturalresources.wales/media/3513/sea-wise-code.pdf), South and West Wales seabird and seal code of conduct (https://www.welshwildlife.org/nature-reserves/code-conduct-seabirds-and-seals).

416. To inform this NIS, **Chapter 9 Fish, Shellfish and Turtle Ecology** of the EIAR prepared for the Project was referred to. The EIAR concludes that there will be no significant impact to any fish species from any impact pathway during the construction, operation or decommissioning of the CWP Project alone (this includes direct damage, disturbance, increased suspended sediment concentration (SSC) and sediment deposition, release of seabed contaminants, underwater noise etc.).

417. Considering the conclusions for the Project Alone assessment, the potential for CWP to provide a non-negligible contribution to in-combination effects on prey availability alongside other projects is considered to be remote. To inform this NIS assessment, the assessment of potential cumulative effects on fish and shellfish receptors carried out as a part of the EIAR (**Chapter 9 Fish, Shellfish and Turtle Ecology**) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to harbour porpoise prey species within the Irish West Coast SACs, it does assess the broader potential for cumulative effects to these wide-ranging fish species to result from CWP in combination with relevant projects, including OWF projects on the east coast of Ireland, including Arklow Bank, Dublin Array and NISA. The EIAR concluded that impacts such as temporary habitat loss or disturbance, long-term habitat loss and increased suspended sediments concentrations are expected to occur over a spatial extent which is very small relative to the wider area over which developments occur, and relative to the size of available spawning and nursery areas for fish. Therefore, these impacts are considered negligible in the context of the wider availability of suitable habitat for marine mammal prey species. In summary, the cumulative assessment for fish and shellfish does not identify any significant cumulative effects resulting from the CWP Project alongside other projects. As such, it is anticipated that during the construction phase and any maintenance / decommissioning activities at CWP and other projects, any impacts to harbour porpoise prey availability will be negligible.

418. Considering the above, there is expected to be no long-term change to harbour porpoise prey species presence, abundance, condition or diversity; as such, there will be no deterioration of key resources (feeding) upon which harbour porpoises depend. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise community at any of the Irish West Coast SACs from changes in prey availability from the CWP Project in-combination with other projects, and no potential for AESI overall.

Changes in available habitat

419. Target 1 of the Conservation Objectives states that *"Species range within the site should not be restricted by artificial barriers to site use. This target may be considered relevant to proposed activities or operations that will result in the permanent exclusion of harbour porpoise from part of its range within the site or will permanently prevent access for the species to suitable habitat therein"*.

420. To recap, the Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with any of the Irish West Coast SACs from changes in available habitat, either ex situ or in situ.

Assessment of the Project In-Combination

421. While offshore projects within the Celtic and Irish Sea MU have the potential to cause disturbance impacts to harbour porpoise, like CWP Project alone, the behavioural effects will be short-lived, and animals are expected to return to baseline activities following the cessation of activities. As such, no activities at any project are expected to result in the permanent exclusion of harbour porpoise from part of their range within any of the Irish West Coast SACs.

422. Considering the above, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community any of the Irish West Coast SACs from changes in

available habitat from the CWP Project in-combination with other projects, and no potential for AESI overall.

3.17.2 Bottlenose dolphin

Table 3-47 Conservation objectives for the Irish West Coast SAC and summary of associated assessment of the CWP Project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
Range: Species range within the site should not be restricted by artificial barriers to site use. **Habitat:** Critical areas, representing habitat used preferentially by bottlenose dolphin, should be conserved in a natural condition. **Population:** Human activities should occur at levels that do not adversely affect the bottlenose dolphin population at the site.	Increased underwater noise:			Adverse effects on the qualifying Annex II features (bottlenose dolphin) of any SACs on the west coast of Ireland will not occur as a result of impacts associated with the CWP Project in-combination with other Projects.
	The CWP Project has committed to implementing both a UXO MMMP and a piling MMMP. Other projects are anticipated to comply with 'industry standards' and follow the NPWS (2014) guidance. Increased underwater noise from the CWP Project in-combination with other projects is not expected to: - adversely affect the range of the population or access to suitable habitat within the site(s); - result in significant disturbance to habitat used by bottlenose dolphins, or the natural behaviour of dolphins within critical areas; - adversely affect the bottlenose dolphin population at the site(s).	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the bottlenose dolphin feature of the site as a result of increased underwater noise from the CWP Project in-combination with other projects.	
	Collision risk:			
	The CWP Project has committed to implementing an EVMP. Other projects are anticipated to comply with Marine	No additional	There is no potential for an impediment to the Conservation Objectives of the	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	Wildlife Watching Codes. Collision risk from the CWP Project in-combination with other projects is not expected to: - adversely affect the range of the population or affect the access to suitable habitat within the site(s); - adversely affect critical habitat used by bottlenose dolphins, or the natural behaviour of dolphins within critical areas; and - adversely affect the bottlenose dolphin population at the site(s).	mitigation is required.	bottlenose dolphin feature of the site(s) as a result of collision risk from the CWP Project in-combination with other projects.	
	Changes in prey availability:			
	Changes in prey availability from the CWP Project in-combination with other projects are not expected to: - impact species range (no impact pathway); - adversely affect critical habitat used by bottlenose dolphins, or the natural behaviour of dolphins within critical areas; and - adversely affect the bottlenose dolphin population at the site(s).	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the bottlenose dolphin feature of the site(s) from changes in prey availability from the CWP Project in-combination with other projects.	
	Changes in available habitat:			

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	Changes in available habitat from the CWP Project in-combination with other projects are not expected to: - adversely affect the range of the population or affect the access to suitable habitat within the site(s); - alter the natural behaviour to an extent that may ultimately interfere with key ecological functions; and - adversely affect the bottlenose dolphin population at the site(s).	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the bottlenose dolphin feature of the site(s) from changes in available habitat from the CWP Project in-combination with other projects.	

Increased underwater noise

423. Target 2 of the Conservation Objectives states that *"proposed activities or operations should not introduce man-made energy (e.g. aerial or underwater noise, light or thermal energy) at levels that could result in a significant negative impact on individuals and / or the population of bottlenose dolphins within the site"*.

424. The Project Alone assessment concluded that, giving consideration to primary mitigation measures, there is no potential for an impediment to the Conservation Objectives of the bottlenose dolphins associated with any of the Irish West Coast SACs from increased underwater noise, either ex situ or in situ.

Assessment of the Project In-Combination

425. This assessment focuses on the potential in-combination impact of construction activities at other offshore projects in the Irish Sea MU for dolphins in 2027 (the same year as piling at the CWP project). As outlined in **EIAR Chapter 11, Appendix 11.1 Cumulative effects assessment for marine mammals**, there are expected to be four other OWFs in the Irish Sea MU that will be constructing in 2027 as well as one tidal project, three coastal projects and one cable project (**Table 3-48**). As such, these offshore projects have been screened into the in-combination assessment for disturbance from underwater noise for bottlenose dolphins.

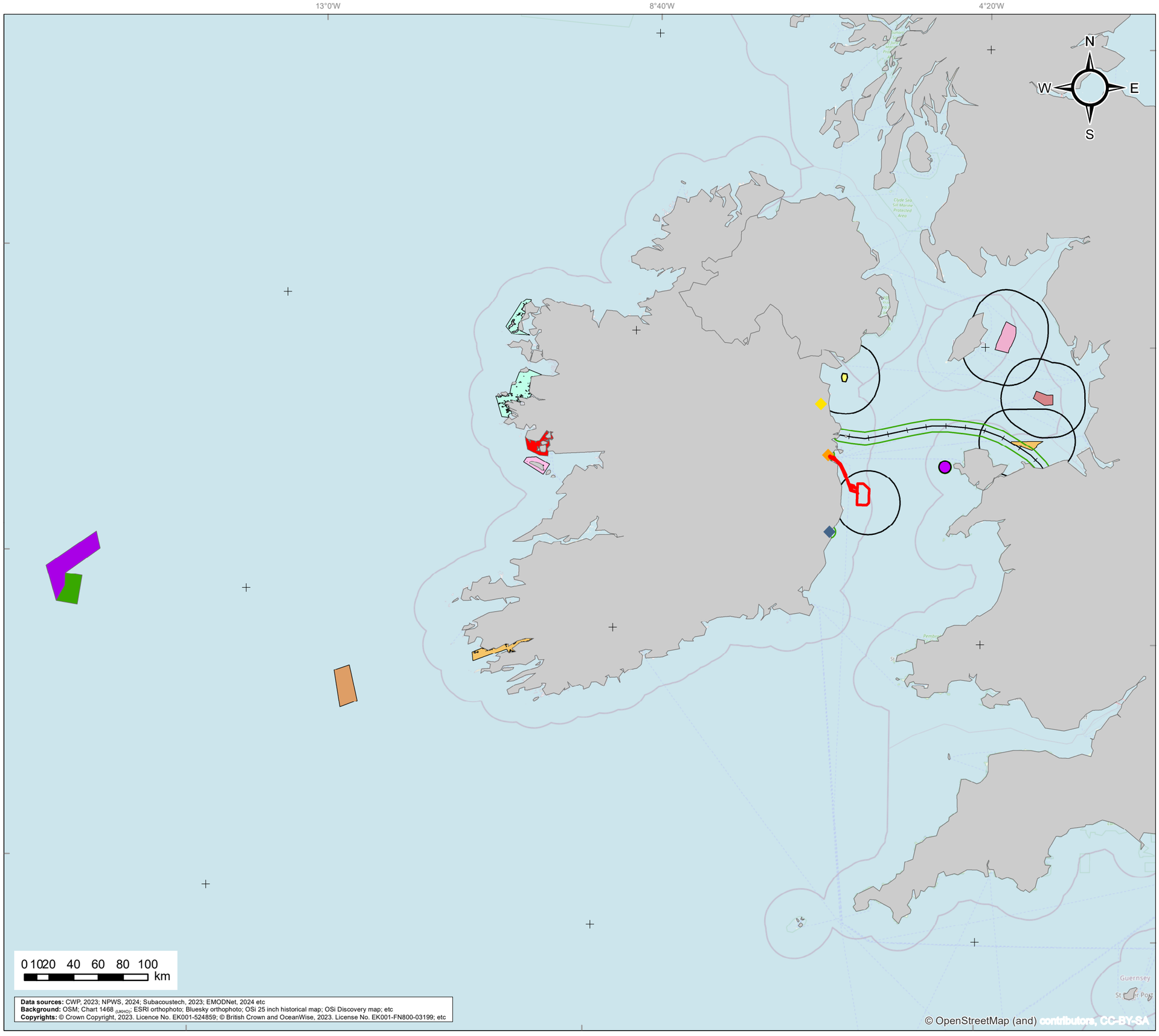
Table 3-48 Offshore projects constructing in the Irish Sea MU in 2027

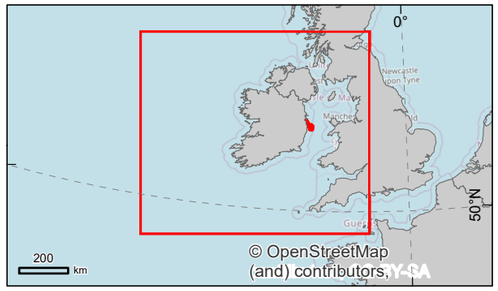
Project	Tier	Type
Codling	-	OWF
Awel y Môr	1	OWF
Arklow Waste Water Treatment	1	Coastal
Maintenance dredging River Boyne, Drogheda	1	Coastal
North Wall Emergency Power Generation Plant	1	Coastal
Oriel	2b	OWF
Morecambe	2b	OWF
Isle of Man	2b	OWF
Mares Connect	3	Cable
Holyhead Deep	3	Tidal

426. To quantitatively assess the potential for disturbance to the SAC for each of the projects in-combination, a 26 km (fixed) or 15 km (floating (i.e., anchor pile installation) and / or jacket (pin) pile installation) EDR was assumed as an indicative disturbance area for each OWF project (this follows the guidance in JNCC (2020) for disturbance assessments to dolphin SACs in England, Wales and Northern Ireland where 26 km EDR is advised for monopiles and 15 km EDR is advised for pin-piles – the same is assumed for bottlenose dolphins here in the absence of species-specific guidance). Additionally, it was assumed that coastal, tidal and cable projects require no piling activities and thus disturbance effects during construction are expected to be limited to activities such as dredging, trenching, cable laying, vessel activity etc for which a maximum 5 km EDR has been assumed (as per Pirotta et al. (2013) for dredging activities).

427. With regards in situ effects, none of the projects in the Irish Sea MU have disturbance impact ranges that overlap with any of the Irish West Coast SACs (**Figure 3-18**). The only project with disturbance ranges that overlap with any of the Irish West coast SACs is Sceirde Rocks which overlaps with the West Connacht Coast SAC, the Kilkeiran Bay and Islands SAC and the Inishmore Island SAC. With regards ex situ effects the total number of animals disturbed is not expected to result in a change in the population trajectory over the long-term. The additional impact from other OWF projects is low in and is thus not expected to result in enough additional disturbance to change the population trajectory. 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.

428. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the bottlenose dolphin population at any of the Irish West Coast SACs from disturbance from underwater noise from the CWP Project in-combination with other projects, and no potential for AESI overall.





Legend

- Planning application boundary
- 5 km EDR
- 26 km EDR
- North Wall Power Plant
- Arklow Waste Treatment Plant
- Dogheda Maintenance Dredge
- Mares Connect
- Holyhead Deep Tidal
- Oriel
- Awel y Mor
- Isle of Man
- Morcambe
- West Connacht Coast SAC
- Belgica Mound Province SAC
- Kenmare River SAC
- Inishmore Island SAC
- Kilkeiran Bay and Islands SAC
- Porcupine Bank Canyon SAC
- South-West Porcupine Bank SAC

codling wind park

Project: Codling Wind Park

SMRU Consulting
understand • assess • mitigate

Figure 3.18:
26 km EDR for piling in combination with the 5 km and 26 km EDR from other construction projects, in relation to the Irish West Coast SACs designated for bottlenose dolphins

CWP doc. number: CWP-SMR-ENG-08-01-MAP-1671

Internal descriptive code:
IRE - PAB..DPNM.THRESH.5EDR.26EDR.CONT - ARK.WASTE.TP..AWEL..DOGHEDA.MAIN.DREDGE..HOLY.DEEP.TIDAL..ISLE.OF.MAN..MARES.CONNECT..MORCAMBE..NORTH WALL PP..ORIEL..WEST.IRISH.SACs - (NIS.Vol.06.a.Sec.03.FIG.04)

Size: A3
Scale: 1:3,000,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
A	Final version	2024/03/07	JC	RRS/EA	JM

Vessel collision

429. Target 2 of the Conservation Objectives states that *"proposed activities or operations should not cause death or injury to individuals to an extent that may ultimately affect the bottlenose dolphin population at the site"*.

430. The Project alone assessment concluded that, giving consideration to primary mitigation measures, there is expected to be no potential for impediment to the Conservation Objectives of the bottlenose dolphin population at any of the Irish West Coast SACs from collision risk, either ex situ or in situ.

Assessment of the Project In-Combination

431. The risk of collision to marine mammals is expected to be primarily localised to within the boundaries of the respective projects. None of the project boundaries overlap with any of the Irish West Coast SACs. The vessel routes and potential ports used by other offshore projects are unknown, and therefore it is not possible to estimate the expected level of vessel activity within the Irish West Coast SACs from other projects. However, it is assumed that all other offshore projects in the Celtic and Irish Sea MU will either adopt a VMP or follow best practice codes of conduct on vessel handing around marine mammals[27] to minimise any potential effects on marine mammals and reduce risk of collision. As such, the potential for collision risk from CWP Project in-combination with other projects is considered negligible.

432. No bottlenose dolphins within any of the Irish West Coast SACs are expected to experience death or injury from vessel collisions and as such, risk of collision will not adversely affect the bottlenose dolphin population at the site. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the bottlenose dolphin population from collision risk from the CWP Project in-combination with other projects, and no potential for AESI overall.

Changes in prey availability

433. Target 2 of the Conservation Objectives states that "*Human activities should occur at levels that do not adversely affect the bottlenose dolphin population at the site. This target also relates to proposed activities or operations that may result in the deterioration of key resources (e.g. water quality, feeding, etc.) upon which bottlenose dolphins depend*".

434. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives of the bottlenose dolphins associated with any of the Irish West Coast SACs from changes in prey availability, either ex situ or in situ.

Assessment of the Project In-Combination

435. Where multiple projects may impact upon bottlenose dolphin fish prey species or the habitats that support the prey within the site, there is the potential for in-combination indirect effects on the bottlenose dolphin population. Therefore, projects with the potential to act in-combination with CWP are those where the spatial footprint of activities (e.g., underwater noise, seabed disturbance) may encroach upon the SACs.

[27] E.g. IWDG code of conduct (https://iwdg.ie/cms_files/wp-content/uploads/2022/06/Code-of-Conduct-When-Encountering-Whales-And-Dolphins-A3-Document.pdf), Sea Wise Code advised by NRW (https://naturalresources.wales/media/3513/sea-wise-code.pdf), South and West Wales seabird and seal code of conduct (https://www.welshwildlife.org/nature-reserves/code-conduct-seabirds-and-seals).

436. To inform this NIS, **Chapter 9 Fish, Shellfish and Turtle Ecology** of the EIAR prepared for the Project was referred to. The EIAR concludes that there will be no significant impact to any fish species from any impact pathway during the construction, operation or decommissioning of the CWP Project alone (this includes direct damage, disturbance, increased suspended sediment concentration (SSC) and sediment deposition, release of seabed contaminants, underwater noise etc.).

437. Considering the conclusions for the Project Alone assessment, the potential for CWP to provide a non-negligible contribution to in-combination effects on prey availability alongside other projects is considered to be remote. To inform this NIS assessment, the assessment of potential cumulative effects on fish and shellfish receptors carried out as a part of the EIAR (**Chapter 9 Fish, Shellfish and Turtle Ecology**) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to bottlenose dolphin prey species within any of the Irish West Coast SACs, it does assess the broader potential for cumulative effects to these wide-ranging fish species to result from CWP in combination with relevant projects, including OWF projects on the east coast of Ireland, including Arklow Bank, Dublin Array and NISA. The EIAR concluded that impacts such as temporary habitat loss or disturbance, long-term habitat loss and increased suspended sediments concentrations are expected to occur over a spatial extent which is very small relative to the wider area over which developments occur, and relative to the size of available spawning and nursery areas for fish. Therefore, these impacts are considered negligible in the context of the wider availability of suitable habitat for marine mammal prey species. In summary, the cumulative assessment for fish and shellfish does not identify any significant cumulative effects resulting from the CWP Project alongside other projects. As such, it is anticipated that during the construction phase and any maintenance / decommissioning activities at CWP and other projects, any impacts to bottlenose dolphin prey availability will be negligible.

438. Considering the above, there is expected to be no long-term change to bottlenose dolphin prey species presence, abundance, condition or diversity; as such, there will be no deterioration of key resources (feeding) upon which bottlenose dolphins depend. There is, therefore, no potential for impediment to the Conservation Objectives of the bottlenose dolphin population at any of the Irish West Coast SACs from changes in prey availability from the CWP Project in-combination with other projects, and no potential for AESI overall.

Changes in available habitat

439. Target 1 of the Conservation Objectives states that *"Species range within the site should not be restricted by artificial barriers to site use. This target may be considered relevant to proposed activities or operations that will result in the permanent exclusion of bottlenose dolphins from part of its range within the site or will permanently prevent access for the species to suitable habitat therein"*.

440. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives of the bottlenose dolphin population associated with any of the Irish West Coast SACs from changes in available habitat, either ex situ or in situ.

Assessment of the Project In-Combination

441. While offshore projects within the Celtic and Irish Sea MU have the potential to cause disturbance impacts to bottlenose dolphins, like CWP Project alone, the behavioural effects will be short-lived, and animals are expected to return to baseline activities following the cessation of activities. As such, no activities at any project are expected to result in the permanent exclusion of bottlenose dolphins from part of their range within the any of the Irish West Coast SACs.

442. Considering the above, there is expected to be no potential for impediment to the Conservation Objectives of any of the Irish West Coast SACs from changes in available habitat from the CWP Project in-combination with other projects, and no potential for AESI overall.

3.18 Slaney River Valley SAC (IE0000781)

443. This SAC is 80 km from the offshore development area and is screened in for Sea lamprey, River lamprey, Twaite shad and Atlantic salmon.

444. The following other plans and projects (**Table 3-49**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-49 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1
Eirgrid Plc – Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

445. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-50 Conservation Objectives, Attributes and Targets for Slaney River Valley SAC and summary of associated in-combination assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
[1095] Sea lamprey (*Petromyzon marinus*)				
Distribution: extent of anadromy. Greater than 75% of main stem length of rivers accessible from estuary	No impact on river morphology and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Population structure of juveniles. At least three age / size groups present	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.18.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
Juvenile density in fine sediment. Juvenile density at least 1 m²	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.18.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Extent and distribution of spawning habitat. No decline in extent and distribution of spawning beds. Improved dispersal of spawning beds into areas upstream of barriers	CWP Project has no connectivity to freshwater spawning habitat and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Availability of juvenile habitat. More than 50% of sample sites positive	There will be no change in juvenile habitat as a result of the CWP Project, and as such no	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
	impact to this attribute and target			the project in-combination with other plans and projects
[1099] River lamprey (*Lampetra fluviatilis*)				
Distribution: extent of anadromy. Greater than 75% of main stem and major tributaries down to second order accessible from estuary	No impact on river morphology, and as such no impact on this attribute and target.	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Population structure of juveniles. At least three age / size groups of river / brook lamprey present	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.18.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
Juvenile density in fine sediment. Mean catchment juvenile density of brook / river lamprey at least 2 / m²	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.18.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Extent and distribution of spawning habitat. No decline in extent and distribution of spawning beds	No impact on spawning habitat and thus no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Availability of juvenile habitat. More than 50% of sample sites positive	No impact on juvenile habitat, and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
				the project in-combination with other plans and projects
[1103] Twaite shad (*Alosa fallax*)				
Distribution: extent of anadromy. Greater than 75% of main stem length of rivers accessible from estuary	No impact on river morphology, and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Population structure- age classes. More than one age class present	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.18.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
Extent and distribution of spawning habitat. No decline in extent and distribution of spawning habitats	No impact on freshwater spawning habitat, and therefore no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Water quality- oxygen levels. No lower than 5 mg / l	No direct connectivity with the SAC and as such no impact on water quality possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Spawning habitat quality: Filamentous algae; macrophytes; sediment. Maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plants) growth	No impact on freshwater spawning habitat, and therefore no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1106] Atlantic salmon (*Salmo salar*)				
Distribution: extent of anadromy. 100% of river channels down to second order accessible from estuary	No impact to river morphology, and as such no impact to this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
Adult spawning fish. Conservation Limit (CL) for each system consistently exceeded	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.18.3**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Salmon fry abundance. Maintain or exceed 0 + fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry / 5 min sampling	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
	Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.18.3**			
Out-migrating smolt abundance. No significant decline	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.18.3**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion (in combination)
Number and distribution of redds. No decline in number and distribution of spawning redds due to anthropogenic causes	No direct connectivity with the SAC and as such no impact possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Water quality. At least Q4 at all sites sampled by EPA	No direct connectivity with the SAC and as such no impact on water quality possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.18.1 Sea lamprey [1095] and River lamprey [1099]

446. Due to similarities in morphology and sensitivity to the relevant impacts, Sea lamprey and River lamprey are considered here together. Conclusions drawn are considered relevant to each individual QIs attributes and targets within this SAC.

447. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- Population structure of juveniles. At least three age / size groups present; and
- Juvenile density in fine sediment. Juvenile density at least 1 m².

448. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to River lamprey.

- Population structure of juveniles. At least three age / size groups of river / brook lamprey present; and
- Juvenile density in fine sediment. Mean catchment juvenile density of brook / river lamprey at least 2 / m².

Increase in underwater noise and vibration

449. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

450. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

451. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

452. Based upon project alone assessments, the most likely effects to arise from offshore activities are short-term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

453. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

454. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

455. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

456. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

457. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

458. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

459. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

460. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

461. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic

fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

462. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

463. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

464. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

465. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

466. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

467. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

468. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

469. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

470. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

471. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

472. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

473. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

474. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

475. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative

habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

476. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

477. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

478. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

479. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

480. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects. .

Presence of structures and predator aggregation

481. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

482. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary

for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

483. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

484. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

485. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

486. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

487. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.18.2 Twaite shad [1103]

488. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- Population structure- age classes. More than one age class present.

Increase in underwater noise and vibration

489. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded

beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

490. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

491. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

492. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

493. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

494. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

495. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

496. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

497. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

498. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal

behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

499. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

500. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

501. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). It is considered that shad may be able to detect low level induced electric fields, however there is no evidence to suggest that EMF plays a role in migration for these species. Furthermore, as a pelagic species, interaction with cable infrastructure is considered highly unlikely for shad.

502. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

503. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

504. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

505. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

506. The CWP Project alone assessment concluded that the effect on shad from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

507. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

508. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

509. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

510. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

511. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

512. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

513. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

514. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

515. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

516. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

517. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

518. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

519. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

520. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

521. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

522. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

523. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

524. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should, however, be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or towards natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

525. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with

no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

526. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

527. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.18.3 Atlantic salmon [1106][28]

528. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- Adult spawning fish. Conservation Limit (CL) for each system consistently exceeded;
- Salmon fry abundance. Maintain or exceed 0 + fry mean catchment - wide abundance threshold value. Currently set at 17 salmon fry / 5 min sampling;
- Out-migrating smolt abundance. No significant decline.

Increase in underwater noise and vibration

529. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

530. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

531. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

532. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability

[28] Freshwater Pearl Mussel (FWPM) are dependent on salmonid individuals on which their larvae develop during a parasitic phase. As such it is considered that where the potential for adverse effects on site integrity through effects on salmon can be ruled out, it can be similarly ruled out for FWPM where they are QIs of the same SAC. Conversely, should adverse effects on site integrity not be ruled out due to effects on salmon for a given European Site, neither shall it be ruled out on FWPM where both are QIs of the same SAC. Accordingly, FWPM are not listed here or elsewhere in the NIS as separate receptors.

of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

533. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

534. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

535. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

536. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

537. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

538. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

539. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

540. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan

- Awel-y-Mor

541. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Armstrong et al. (2015) conducted a review of the potential effects of EMF on Atlantic salmon for Marine Scotland. It determined that salmonids did not exhibit behavioural responses when exposed to EMF levels (up to 95 µT; Armstrong et al., 2015). Furthermore, as a pelagic species that mainly travels in the top levels of the marine environment, interaction with cabling infrastructure is considered highly unlikely for salmon.

542. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

543. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

544. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

545. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

546. The CWP Project alone assessment concluded that the effect on salmon from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

547. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

548. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

549. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

550. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

551. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to this QI, with effects constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

552. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

553. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

554. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP

Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

555. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

556. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

557. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

558. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

559. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

560. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

561. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

562. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine

environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

563. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

564. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

565. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

566. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

567. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.19 Cardigan Bay / Bae Ceredigion SAC (UK0012712)

568. The Cardigan Bay / Bae Ceredigion SAC is 100 km from the offshore development area and is screened in for Bottlenose Dolphin, Sea Lamprey and River Lamprey.

569. The following other plans and projects (**Table 3-51**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-51 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Eirgrid Plc – Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

570. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

3.19.1 Sea lamprey [1095] and River lamprey [1099]

Table 3-52 Conservation Objectives, Attributes and Targets for Cardigan Bay / Bae Ceredigion and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect (project alone)	Conclusion
[1095] Sea lamprey *Conservation Objective: To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.*				
Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site	Increase in underwater noise and vibration Presence of EMF and heat Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.19.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future	Increase in underwater noise and vibration Presence of EMF and heat Temporary increase in SSC and contaminated sediments	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with

Attributes and targets	Predicted effect	Mitigation	Residual effect (project alone)	Conclusion
	Direct impacts on habitats See **Section 3.19.1**			other plans and projects
Supporting habitats and species. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics within the site and population beyond the site is stable or increasing	Increase in underwater noise and vibration Presence of EMF and heat Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.19.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1099] River lamprey (*Lampetra fluviatilis*) *Conservation Objective: To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.*				
Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site	Increase in underwater noise and vibration Presence of EMF and heat Temporary increase in SSC and contaminated sediments Direct impacts on habitats	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (project alone)	Conclusion
	See **Section 3.19.1**			
Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future	Increase in underwater noise and vibration Presence of EMF and heat Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.19.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Supporting habitats and species. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics within the site and population beyond the site is stable or increasing.	Increase in underwater noise and vibration Presence of EMF and heat Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.19.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

571. Due to similarities in morphology and sensitivity to the relevant impacts, Sea lamprey and River lamprey are considered here together. Conclusions drawn are considered relevant to each individual QIs attributes and targets within this SAC.

572. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site.
- Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.
- Supporting habitats and species. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics within the site and population beyond the site is stable or increasing.

573. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to River lamprey.

- Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site.
- Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.
- Supporting habitats and species. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics within the site and population beyond the site is stable or increasing.

Increase in underwater noise and vibration

574. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

575. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

576. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

577. Based upon project alone assessments, the most likely effects to arise from offshore activities are short-term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small

predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

578. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

579. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

580. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

581. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

582. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

583. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

584. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

585. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

586. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

587. EMF arising from all plans or projects are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

588. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

589. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

590. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

591. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

592. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

593. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

594. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

595. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

596. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

597. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

598. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

599. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP

Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

600. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

601. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

602. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

603. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

604. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

605. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

606. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

607. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine

environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

608. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

609. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

610. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

611. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

612. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.20 River Barrow and River Nore SAC (IE0002162)

613. This SAC is 147 km from the offshore development area and is screened in for Sea lamprey, River lamprey, Twaite shad and Atlantic salmon.

614. The following other plans and projects (**Table 3-53**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-53 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

615. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-54 Conservation Objectives, Attributes and Targets for River Barrow and River Nore SAC and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1095] Sea lamprey (*Petromyzon marinus*)				
Distribution: extent of anadromy. Greater than 75% of main stem length of rivers accessible from estuary	No impact on river morphology and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Population structure of juveniles. At least three age / size groups present	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.20.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
Juvenile density in fine sediment. Juvenile density at least 1 / m²	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.20.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Extent and distribution of spawning habitat. No decline in extent and distribution of spawning beds	CWP Project has no connectivity to freshwater spawning habitat and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Availability of juvenile habitat. More than 50% of sample sites positive	There will be no change in juvenile habitat as a result of the CWP Project, and as such no impact to this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1099] River lamprey (*Lampetra fluviatilis*)				
Distribution. Access to all water courses down to first order streams	No impact on river morphology, and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Population structure of juveniles. At least three age / size groups of river / brook lamprey present	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.20.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Juvenile density in fine sediment. Mean catchment juvenile density of brook / river lamprey at least 2 / m²	Increase in underwater noise and vibration	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.20.1**			combination with other plans and projects
Extent and distribution of spawning habitat. No decline in extent and distribution of spawning beds	No impact on spawning habitat and thus no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Availability of juvenile habitat. More than 50% of sample sites positive	No impact on juvenile habitat, and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1103] Twaite shad (*Alosa fallax*)				
Distribution: extent of anadromy. Greater than 75% of main stem length of rivers accessible from estuary	No impact on river morphology, and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Population structure: age classes. More than one age class present	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.20.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Extent and distribution of spawning habitat. No decline in extent and distribution of spawning habitats	No impact on freshwater spawning habitat, and therefore no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
				combination with other plans and projects
Water quality: oxygen levels. No lower than 5mg / l	No direct connectivity with the SAC and as such no impact on water quality possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Spawning habitat quality: Filamentous algae; macrophytes; sediment. Maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plants) growth	No impact on freshwater spawning habitat, and therefore no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1106] Atlantic salmon (*Salmo salar*)				
Distribution: extent of anadromy. 100% of river channels down to second order accessible from estuary	No impact to river morphology, and as such no impact to this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Adult spawning fish. Conservation Limit (CL) for each system consistently exceeded	Increase in underwater noise and vibration Presence of EMF	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.20.3**			
Salmon fry abundance. Maintain or exceed 0 + fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry / 5 min sampling	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation.	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	See **Section 3.20.3**			
Out-migrating smolt abundance. No significant decline	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.20.3**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Number and distribution of redds. No decline in number and distribution of spawning redds due to anthropogenic causes	No direct connectivity with the SAC and as such no impact on possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Water quality. At least Q4 at all sites sampled by EPA	No direct connectivity with the SAC and as such no impact on water quality possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.20.1 Sea lamprey [1095] and River lamprey [1099]

616. Due to similarities in morphology and sensitivity to the relevant impacts, Sea lamprey and River lamprey are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

617. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- Population structure of juveniles. At least three age / size groups present; and
- Juvenile density in fine sediment. Juvenile density at least 1 / m².

618. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to River lamprey.

- Population structure of juveniles. At least three age / size groups of river / brook lamprey present; and
- Juvenile density in fine sediment. Mean catchment juvenile density of brook / river lamprey at least 2 / m²

Increase in underwater noise and vibration

619. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

620. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

621. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

622. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

623. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

624. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

625. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

626. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

627. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

628. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

629. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

630. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

631. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic

fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

632. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

633. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

634. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

635. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

636. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

637. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

638. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

639. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

640. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

641. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

642. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

643. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

644. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

645. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative

habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

646. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

647. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

648. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

649. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

650. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

651. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

652. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary

for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

653. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

654. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

655. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

656. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

657. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.20.2 Twaite shad [1103]

658. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- Population structure: age classes. More than one age class present.

Increase in underwater noise and vibration

659. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded

beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

660. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

661. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

662. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

663. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

664. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

665. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

666. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

667. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

668. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal

behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

669. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

670. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

671. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). It is considered that shad may be able to detect low level induced electric fields, however there is no evidence to suggest that EMF plays a role in migration for these species. Furthermore, as a pelagic species, interaction with cable infrastructure is considered highly unlikely for shad.

672. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

673. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

674. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

675. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

676. The CWP Project alone assessment concluded that the effect on shad from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

677. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

678. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

679. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

680. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

681. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

682. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

683. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

684. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

685. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

686. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

687. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

688. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

689. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

690. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

691. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

692. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

693. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

694. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

695. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with

no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

696. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

697. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.20.3 Atlantic salmon [1106][29]

698. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- Adult spawning fish. CL for each system consistently exceeded;
- Salmon fry abundance. Maintain or exceed 0 + fry mean catchment - wide abundance threshold value. Currently set at 17 salmon fry / 5 min sampling;
- Out-migrating smolt abundance. No significant decline.

Increase in underwater noise and vibration

699. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

700. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

701. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

702. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability

[29] Freshwater Pearl Mussel (FWPM) are dependent on salmonid individuals on which their larvae develop during a parasitic phase. As such it is considered that where the potential for adverse effects on site integrity through effects on salmon can be ruled out, it can be similarly ruled out for FWPM where they are QIs of the same SAC. Conversely, should adverse effects on site integrity not be ruled out due to effects on salmon for a given European Site, neither shall it be ruled out on FWPM where both are QIs of the same SAC. Accordingly, FWPM are not listed here or elsewhere in the NIS as separate receptors.

of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

703. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

704. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

705. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

706. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

707. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

708. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

709. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

710. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan

- Awel-y-Mor

711. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Armstrong et al. (2015) conducted a review of the potential effects of EMF on Atlantic salmon for Marine Scotland. It determined that salmonids did not exhibit behavioural responses when exposed to EMF levels (up to 95 µT; Armstrong et al., 2015). Furthermore, as a pelagic species that mainly travels in the top levels of the marine environment, interaction with cabling infrastructure is considered highly unlikely for salmon.

712. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

713. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

714. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

715. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

716. The CWP Project alone assessment concluded that the effect on salmon from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

717. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

718. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

719. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

720. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

721. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to this QI, with effects constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

722. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

723. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

724. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP

Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

725. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

726. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

727. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

728. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

729. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

730. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

731. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

732. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine

environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

733. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

734. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

735. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

736. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

737. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.21 Lower River Suir SAC (IE0002137)

738. This SAC is 164 km from the offshore development area and is screened in for Sea lamprey, River lamprey, Twaite shad and Atlantic salmon.

739. The following other plans and projects (**Table 3-55**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-55 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

740. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-56 Conservation Objectives, Attributes and Targets for Lower River Suir SAC and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1095] Sea lamprey (*Petromyzon marinus*)				
Distribution: extent of anadromy. Greater than 75% of main stem length of rivers accessible from estuary	No impact on river morphology and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Population structure of juveniles. At least three age / size groups present	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.21.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
Juvenile density in fine sediment. Juvenile density at least 1 / m²	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.21.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Extent and distribution of spawning habitat. No decline in extent and distribution of spawning beds	CWP Project has no connectivity to freshwater spawning habitat and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Availability of juvenile habitat. More than 50% of sample sites positive	There will be no change in juvenile habitat as a result of the CWP Project, and	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	as such no impact to this attribute and target			integrity predicted from the project in-combination with other plans and projects
[1099] River lamprey (*Lampetra fluviatili*)				
Distribution. Access to all water courses down to first order streams	No impact on river morphology, and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Population structure of juveniles. At least three age / size groups of river / brook lamprey present	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation.	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	See **Section 3.21.1**			
Juvenile density in fine sediment. Mean catchment juvenile density of brook / river lamprey at least 2/m²	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.21.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Extent and distribution of spawning habitat. No decline in extent and distribution of spawning beds	No impact on spawning habitat and thus no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Availability of juvenile habitat. More than 50% of sample sites positive	No impact on juvenile habitat, and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
				the project in-combination with other plans and projects
[1103] Twaite shad (*Alosa fallax*)				
Distribution: extent of anadromy. Greater than 75% of main stem length of rivers accessible from estuary	No impact on river morphology, and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Population structure: age classes. More than one age class present	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.21.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
Extent and distribution of spawning habitat. No decline in extent and distribution of spawning habitats	No impact on freshwater spawning habitat, and therefore no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Water quality: oxygen levels. No lower than 5 mg / l	No direct connectivity with the SAC and as such no impact on water quality possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Spawning habitat quality: Filamentous algae; macrophytes; sediment. Maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and macrophyte (rooted higher plants) growth	No impact on freshwater spawning habitat, and therefore no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1106] Atlantic salmon (*Salmo salar*)				
Distribution: extent of anadromy. 100% of river channels down to second order accessible from estuary	No impact to river morphology, and as such no impact to this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
				integrity predicted from the project in-combination with other plans and projects
Adult spawning fish. Conservation limit (CL) for each system consistently exceeded	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.21.3**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Salmon fry abundance. Maintain or exceed 0 + fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry / 5 minutes sampling	Increase in underwater noise and vibration Presence of EMF	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.21.3**			
Out-migrating smolt abundance. No significant decline	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation.	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	See **Section 3.21.3**			
Number and distribution of redds. No decline in number and distribution of spawning redds due to anthropogenic causes	No direct connectivity with the SAC and as such no impact possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Water quality. At least Q4 at all sites sampled by EPA	No direct connectivity with the SAC and as such no impact on water quality possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.21.1 Sea lamprey [1095] and River lamprey [1099]

741. Due to similarities in morphology and sensitivity to the relevant impacts, Sea lamprey and River lamprey are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

742. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- Population structure of juveniles. At least three age / size groups present; and
- Juvenile density in fine sediment. Juvenile density at least 1 / m².

743. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to River lamprey.

- Population structure of juveniles. At least three age / size groups of river / brook lamprey present; and
- Juvenile density in fine sediment. Mean catchment juvenile density of brook / river lamprey at least 2 / m².

Increase in underwater noise and vibration

744. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

745. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

746. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

747. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

748. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

749. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

750. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

751. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

752. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

753. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

754. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

755. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

756. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic

fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

757. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

758. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

759. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

760. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

761. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

762. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

763. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

764. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

765. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

766. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

767. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

768. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

769. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

770. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative

habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

771. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

772. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

773. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

774. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

775. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

776. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

777. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary

for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

778. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

779. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or towards natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

780. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

781. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

782. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.21.2 Twaite shad [1103]

783. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- Population structure: age classes. More than one age class present.

Increase in underwater noise and vibration

784. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid

recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

785. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

786. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

787. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

788. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

789. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

790. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

791. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

792. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

793. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts

present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

794. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

795. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

796. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). It is considered that shad may be able to detect low level induced electric fields, however there is no evidence to suggest that EMF plays a role in migration for these species. Furthermore, as a pelagic species, interaction with cable infrastructure is considered highly unlikely for shad.

797. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

798. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

799. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

800. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

801. The CWP Project alone assessment concluded that the effect on shad from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

802. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

803. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

804. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

805. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

806. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

807. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

808. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

809. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

810. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

811. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

812. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

813. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

814. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

815. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

816. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

817. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

818. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

819. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

820. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with

no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

821. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

822. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.21.3 Atlantic salmon [1106][30]

823. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- Adult spawning fish. CL for each system consistently exceeded;
- Salmon fry abundance. Maintain or exceed 0+ fry mean catchment – wide abundance threshold value. Currently set at 17 salmon fry / 5 minutes sampling; and
- Out-migrating smolt abundance. No significant decline.

Increase in underwater noise and vibration

824. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

825. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

826. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

827. Based upon project alone assessments, the most likely effects to arise from offshore activities are short-term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability

[30] Freshwater Pearl Mussel (FWPM) are dependent on salmonid individuals on which their larvae develop during a parasitic phase. As such it is considered that where the potential for adverse effects on site integrity through effects on salmon can be ruled out, it can be similarly ruled out for FWPM where they are QIs of the same SAC. Conversely, should adverse effects on site integrity not be ruled out due to effects on salmon for a given European Site, neither shall it be ruled out on FWPM where both are QIs of the same SAC. Accordingly, FWPM are not listed here or elsewhere in the NIS as separate receptors.

of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

828. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

829. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

830. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

831. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

832. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

833. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

834. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

835. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan

- Awel-y-Mor

836. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Armstrong et al. (2015) conducted a review of the potential effects of EMF on Atlantic salmon for Marine Scotland. It determined that salmonids did not exhibit behavioural responses when exposed to EMF levels (up to 95 µT; Armstrong et al., 2015). Furthermore, as a pelagic species that mainly travels in the top levels of the marine environment, interaction with cabling infrastructure is considered highly unlikely for salmon.

837. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

838. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

839. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

840. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

841. The CWP Project alone assessment concluded that the effect on salmon from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

842. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

843. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

844. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

845. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

846. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to this QI, with effects constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

847. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

848. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

849. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP

Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

850. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

851. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

852. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

853. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

854. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

855. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

856. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

857. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine

environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

858. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

859. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

860. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

861. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

862. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.22 Blackwater River (Cork / Waterford) SAC (IE0002170)

863. This SAC is 204 km from the offshore development area and is screened in for Sea lamprey, River lamprey, Twaite shad and Atlantic salmon.

864. The following other plans and projects (**Table 3-57**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-57 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

865. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-58 Conservation Objectives, Attributes and Targets for Blackwater River (Cork / Waterford) SAC and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1095] Sea lamprey (*Petromyzon marinus*)				
Distribution: extent of anadromy. Greater than 75% of main stem length of rivers accessible from estuary	No impact on river morphology and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Population structure of juveniles. At least three age / size groups present	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.22.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Juvenile density in fine sediment. Juvenile density at least 1 / m²	Increase in underwater noise and vibration	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.22.1**			project in-combination with other plans and projects
Extent and distribution of spawning habitat. No decline in extent and distribution of spawning beds	CWP Project has no connectivity to freshwater spawning habitat and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Availability of juvenile habitat. More than 50% of sample sites positive. See map 10 for recorded locations	There will be no change in juvenile habitat as a result of the CWP Project, and as such no impact to this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1099] River lamprey (*Lampetra fluviatilis*)				
Distribution. Access to all water courses down to first order streams	No impact on river morphology, and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
				project in-combination with other plans and projects
Population structure of juveniles. At least three age / size groups of river / brook lamprey present	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.22.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Juvenile density in fine sediment. Mean catchment juvenile density of brook / river lamprey at least 2 / m^2	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Presence of structures and predator aggregation. See **Section 3.22.1**			
Extent and distribution of spawning habitat. No decline in extent and distribution of spawning beds.	No impact on spawning habitat and thus no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Availability of juvenile habitat. More than 50% of sample sites positive	No impact on juvenile habitat, and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1103] Twaite shad (*Alosa fallax*)				
Distribution: extent of anadromy. Greater than 75% of main stem length of rivers accessible from estuary	No impact on river morphology, and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Population structure: age classes. More than one age class present	Increase in underwater noise and vibration Presence of EMF	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.22.2**			
Extent and distribution of spawning habitat. No decline in extent and distribution of spawning habitats	No impact on freshwater spawning habitat, and therefore no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Water quality: oxygen levels. No lower than 5 mg / l	No direct connectivity with the SAC and as such no impact on water quality possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Spawning habitat quality: Filamentous algae; macrophytes; sediment. Maintain stable gravel substrate with very little fine material, free of filamentous algal (macroalgae) growth and	No impact on freshwater spawning habitat, and therefore no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
macrophyte (rooted higher plant) growth				
[1106] Atlantic salmon (*Salmo salar*) (only in fresh water)				
Distribution: extent of anadromy. 100% of river channels down to second order accessible from estuary	No impact to river morphology, and as such no impact to this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Adult spawning fish. Conservation Limit (CL) for each system consistently exceeded	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.22.3**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Salmon fry abundance. Maintain or exceed 0 + fry mean catchment-wide abundance threshold value.	Increase in underwater noise and vibration Presence of EMF	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
Currently set at 17 salmon fry / 5 min sampling	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.22.3**			project in-combination with other plans and projects
Out-migrating smolt abundance. No significant decline	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.22.3**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Number and distribution of redds. No decline in number and distribution of spawning	No direct connectivity with the SAC and as such no impact possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
redds due to anthropogenic causes				site integrity predicted from the project in-combination with other plans and projects
Water quality. At least Q4 at all sites sampled by EPA	No direct connectivity with the SAC and as such no impact on water quality possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.22.1 Sea lamprey [1095] and River lamprey [1099]

866. Due to similarities in morphology and sensitivity to the relevant impacts, Sea lamprey and River lamprey are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

867. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- Population structure of juveniles. At least three age / size groups present; and
- Juvenile density in fine sediment. Juvenile density at least 1 / m².

868. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to River lamprey.

- Population structure of juveniles. At least three age / size groups of river / brook lamprey present; and
- Juvenile density in fine sediment. Mean catchment juvenile density of brook / river lamprey at least 2 / m².

Increase in underwater noise and vibration

869. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

870. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

871. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

872. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

873. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

874. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

875. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

876. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

877. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

878. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

879. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

880. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

881. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic

fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

882. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

883. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

884. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

885. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

886. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

887. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

888. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

889. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

890. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

891. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

892. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

893. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

894. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

895. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative

habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

896. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

897. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

898. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

899. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

900. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

901. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

902. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary

for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

903. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

904. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

905. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

906. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

907. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.22.2 Twaite shad [1103]

908. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- Population structure: age classes. More than one age class present.

Increase in underwater noise and vibration

909. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded

beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

910. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

911. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

912. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

913. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

914. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

915. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

916. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

917. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

918. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal

behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

919. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

920. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

921. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). It is considered that shad may be able to detect low level induced electric fields, however there is no evidence to suggest that EMF plays a role in migration for these species. Furthermore, as a pelagic species, interaction with cable infrastructure is considered highly unlikely for shad.

922. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

923. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

924. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

925. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

926. The CWP Project alone assessment concluded that the effect on shad from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

927. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

928. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

929. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

930. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

931. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

932. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

933. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

934. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

935. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

936. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

937. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

938. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

939. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

940. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

941. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

942. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

943. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

944. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

945. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with

no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

946. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

947. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.22.3 Atlantic salmon [1106][31]

948. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- Adult spawning fish. CL for each system consistently exceeded;
- Salmon fry abundance. Maintain or exceed 0 + fry mean catchment - wide abundance threshold value. Currently set at 17 salmon fry / 5 min sampling; and
- Out-migrating smolt abundance. No significant decline.

Increase in underwater noise and vibration

949. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

950. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

951. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

952. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability

[31] Freshwater Pearl Mussel (FWPM) are dependent on salmonid individuals on which their larvae develop during a parasitic phase. As such it is considered that where the potential for adverse effects on site integrity through effects on salmon can be ruled out, it can be similarly ruled out for FWPM where they are QIs of the same SAC. Conversely, should adverse effects on site integrity not be ruled out due to effects on salmon for a given European Site, neither shall it be ruled out on FWPM where both are QIs of the same SAC. Accordingly, FWPM are not listed here or elsewhere in the NIS as separate receptors.

of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

953. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

954. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

955. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

956. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

957. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

958. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

959. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

960. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan

- Awel-y-Mor

961. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Armstrong et al. (2015) conducted a review of the potential effects of EMF on Atlantic salmon for Marine Scotland. It determined that salmonids did not exhibit behavioural responses when exposed to EMF levels (up to 95 µT; Armstrong et al., 2015). Furthermore, as a pelagic species that mainly travels in the top levels of the marine environment, interaction with cabling infrastructure is considered highly unlikely for salmon.

962. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

963. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

964. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

965. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

966. The CWP Project alone assessment concluded that the effect on salmon from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

967. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

968. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

969. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

970. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

971. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to this QI, with effects constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

972. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

973. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

974. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP

Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

975. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

976. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

977. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

978. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

979. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

980. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

981. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

982. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine

environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

983. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

984. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

985. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

986. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

987. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.23 River Boyne and River Blackwater SAC (IE0002299)

988. This SAC is 56 km from the offshore development area and is screened in for River lamprey and Atlantic salmon.

989. The following other plans and projects (**Table 3-59**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-59 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

990. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-60 Conservation Objectives, Attributes and Targets for River Boyne and River Blackwater SAC and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1099] River lamprey (*Lampetra fluviatilis*)				
Distribution. Restore access to all water courses down to first order streams	No impact on river morphology and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Distribution of larvae. Not less than 50% of sample sites with suitable habitat positive for larval brook / river lamprey	No impact on river morphology, and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Population structure of larvae. At least three age / size classes of larval brook / river lamprey present	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.23.1**			
Larval lamprey density in fine sediment. Mean density of brook / river larval lamprey in sites with suitable habitat more than 5 / m²	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	predator aggregation. See **Section 3.23.1**			
Extent and distribution of spawning nursery habitat. No decline in extent and distribution of spawning and nursery beds	No impact on spawning habitat and thus no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1106] Atlantic salmon (*Salmo salar*)				
Distribution: extent of anadromy. 100% of river channels down to second order accessible from estuary	No impact to river morphology, and as such no impact to this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Adult spawning fish. Conservation limit (CL) for each system consistently exceeded	Increase in underwater noise and vibration Presence of EMF	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.23.2**			with other plans and projects
Salmon fry abundance. Maintain or exceed 0 + fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry / 5 minutes sampling	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Presence of structures and predator aggregation. See **Section 3.23.2**			
Out-migrating smolt abundance. No significant decline	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.23.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Number and distribution of redds. No decline in number and distribution of spawning	No direct connectivity with the	None required	N / A	No impediment to the Conservation Objective being met,

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
redds due to anthropogenic causes	SAC and as such no impact possible			and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Water quality. At least Q4 at all sites sampled by EPA	No direct connectivity with the SAC and as such no impact on water quality possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.23.1 River lamprey [1099]

991. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to River lamprey.

- Population structure of larvae. At least three age / size classes of larval brook / river lamprey present; and
- Larval lamprey density in fine sediment. Mean density of brook / river larval lamprey in sites with suitable habitat more than 5 / m².

Increase in underwater noise and vibration

992. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

993. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

994. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

995. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

996. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

997. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

998. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential

to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

999. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1000. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1001. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1002. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1003. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1004. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

1005. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1006. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1007. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1008. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1009. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1010. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1011. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1012. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1013. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1014. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1015. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1016. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1017. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1018. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1019. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2

- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1020. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

1021. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1022. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1023. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1024. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1025. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1026. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array

- Oriel
- Mona
- Morgan
- Awel-y-Mor

1027. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1028. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1029. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1030. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.23.2 Atlantic salmon [1106]

1031. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- Adult spawning fish. CL for each system consistently exceeded;
- Salmon fry abundance. Maintain or exceed 0 + fry mean catchment - wide abundance threshold value. Currently set at 17 salmon fry / 5 minutes sampling; and
- Out-migrating smolt abundance. No significant decline

Increase in underwater noise and vibration

1032. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1033. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low.

Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1034. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1035. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1036. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1037. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1038. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1039. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1040. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1041. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1042. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is

considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1043. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1044. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Armstrong et al. (2015) conducted a review of the potential effects of EMF on Atlantic salmon for Marine Scotland. It determined that salmonids did not exhibit behavioural responses when exposed to EMF levels (up to 95 µT; Armstrong et al., 2015). Furthermore, as a pelagic species that mainly travels in the top levels of the marine environment, interaction with cabling infrastructure is considered highly unlikely for salmon.

1045. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1046. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1047. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1048. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1049. The CWP Project alone assessment concluded that the effect on salmon from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to

avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1050. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1051. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1052. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1053. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1054. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to this QI, with effects constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1055. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1056. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1057. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1058. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1059. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1060. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

1061. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1062. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1063. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1064. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1065. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1066. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1067. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1068. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1069. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1070. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.24 Cummeen Strand / Drumcliff Bay (Sligo Bay) SAC (IE0000627)

1071. This SAC is 501 km from the offshore development area and is screened in for Sea lamprey and River lamprey. However the Conservation Objectives for this site are such that there can be no impediment to any Conservation Objective or target from the proposed works as there will be no impact on any riverine habitat, and thus it can be concluded beyond scientific doubt that there will be no adverse effects on site integrity.

Table 3-61 Conservation Objectives, Attributes and Targets for Cummeen Strand / Drumcliff Bay (Sligo Bay) SAC and associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1095] Sea lamprey (*Petromyzon marinus*)				
Distribution: extent of anadromy. No barriers for migratory life stages of lamprey moving from freshwater to marine habitats and vice versa	No impact on river morphology and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1099] River lamprey (*Lampetra fluviatilis*)				
Distribution: extent of anadromy. No barriers for migratory life stages of lamprey moving from freshwater to marine habitats and vice versa	No impact on river morphology, and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.25 Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (IE0000365)

1072. This SAC is 413 km from the offshore development area and is screened in for Sea lamprey, River lamprey and Atlantic salmon.

1073. The following other plans and projects (**Table 3-62**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-62 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

1074. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-63 Conservation Objectives, Attributes and Targets for Kilarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1095] Sea lamprey (*Petromyzon marinus*)				
Distribution: extent of anadromy. Greater than 75% of main stem length of rivers accessible from estuary	No impact on river morphology and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Population structure of juveniles. At least three age / size groups present	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	predator aggregation. See **Section 3.25.1**			
Juvenile density in fine sediment. Juvenile density at least 1 / m^2	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.25.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Extent and distribution of spawning habitat. No decline in extent and distribution of spawning beds	CWP Project has no connectivity to freshwater spawning habitat and as such no	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	potential to affect this attribute and target			predicted from the project in-combination with other plans and projects
Availability of juvenile habitat. More than 10% of sample sites positive	There will be no change in juvenile habitat as a result of the CWP Project, and as such no impact to this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1099] River lamprey (*Lampetra fluviatilis*)				
Distribution. Access to all water courses down to first order streams	No impact on river morphology, and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Population structure of juveniles. At least three age / size groups of river / brook lamprey present	Increase in underwater noise and vibration Presence of EMF	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.25.1**			with other plans and projects
Juvenile density in fine sediment. Mean catchment juvenile density of river / brook lamprey at least 5 / m²	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Presence of structures and predator aggregation. See **Section 3.25.1**			
Extent and distribution of spawning habitat. No decline in extent and distribution of spawning beds	No impact on spawning habitat and thus no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Availability of juvenile habitat. More than 50% of sample sites positive	No impact on juvenile habitat, and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1106] Atlantic salmon (*Salmo salar*)				
Distribution: extent of anadromy. 100% of river channels down to second order accessible from estuary	No impact to river morphology, and as such no impact to this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
				predicted from the project in-combination with other plans and projects
Adult spawning fish. Conservation limit (CL) for each system consistently exceeded	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.25.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Salmon fry abundance. Maintain or exceed 0 + fry mean catchment-wide abundance threshold value. Currently set at	Increase in underwater noise and vibration	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
17 salmon fry / 5 minutes sampling	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.25.2**			predicted from the project in-combination with other plans and projects
Out-migrating smolt abundance. No significant decline	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.25.2**			
Number and distribution of redds. No decline in number and distribution of spawning redds due to anthropogenic causes	No direct connectivity with the SAC and as such no impact possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Water quality. At least Q4 at all sites sampled by EPA	No direct connectivity with the SAC and as such no impact on water quality possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.25.1 Sea lamprey [1095] and River lamprey [1099]

1075. Due to similarities in morphology and sensitivity to the relevant impacts, Sea lamprey and River lamprey are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

1076. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- Population structure of juveniles. At least three age / size groups present; and
- Juvenile density in fine sediment. Juvenile density at least 1 / m^2.

1077. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to River lamprey.

- Population structure of juveniles. At least three age / size groups of river / brook lamprey present; and
- Juvenile density in fine sediment. Mean catchment juvenile density of river / brook lamprey at least 5 / m^2.

Increase in underwater noise and vibration

1078. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1079. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1080. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1081. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1082. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1083. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1084. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1085. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1086. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1087. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1088. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1089. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1090. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick and Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic

fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

1091. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1092. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1093. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1094. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1095. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1096. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1097. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1098. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1099. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1100. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1101. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1102. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1103. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1104. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative

habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1105. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1106. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

1107. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1108. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1109. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1110. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1111. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary

for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1112. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1113. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1114. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1115. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1116. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.25.2 Atlantic salmon [1106][32]

1117. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- Adult spawning fish. CL for each system consistently exceeded;
- Salmon fry abundance. Maintain or exceed 0 + fry mean catchment - wide abundance threshold value. Currently set at 17 salmon fry / 5 minutes sampling; and

[32] Freshwater Pearl Mussel (FWPM) are dependent on salmonid individuals on which their larvae develop during a parasitic phase. As such it is considered that where the potential for adverse effects on site integrity through effects on salmon can be ruled out, it can be similarly ruled out for FWPM where they are QIs of the same SAC. Conversely, should adverse effects on site integrity not be ruled out due to effects on salmon for a given European Site, neither shall it be ruled out on FWPM where both are QIs of the same SAC. Accordingly, FWPM are not listed here or elsewhere in the NIS as separate receptors.

- Out-migrating smolt abundance. No significant decline.

Increase in underwater noise and vibration

1118. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1119. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1120. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1121. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1122. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1123. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1124. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1125. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1126. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1127. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1128. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1129. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1130. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Armstrong et al. (2015) conducted a review of the potential effects of EMF on Atlantic salmon for Marine Scotland. It determined that salmonids did not exhibit behavioural responses when exposed to EMF levels (up to 95 µT; Armstrong et al., 2015). Furthermore, as a pelagic species that mainly travels in the top levels of the marine environment, interaction with cabling infrastructure is considered highly unlikely for salmon.

1131. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1132. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1133. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1134. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1135. The CWP Project alone assessment concluded that the effect on salmon from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1136. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1137. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1138. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1139. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when

considered proportionally to the areas available around each project, the impact remains negligible in scale.

1140. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to this QI, with effects constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1141. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1142. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1143. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1144. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1145. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1146. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a

negligible spatial extent of the QIs marine phase when 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.

1147. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1148. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1149. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1150. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1151. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1152. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1153. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are

travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1154. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1155. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1156. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.26 Killala Bay / Moy Estuary SAC (IE0000458)

1157. This SAC is 508 km from the offshore development area and is screened in for Sea lamprey.

1158. The following other plans and projects (**Table 3-64**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-64 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1
Eirgrid Plc – Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

1159. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-65 Conservation Objectives, Attributes and Targets for Kilala Bay / Moy Estuary SAC and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1095] Sea lamprey (*Petromyzon marinus*)				
Distribution: extent of anadromy. No barriers for migratory life stages of lamprey moving from freshwater to marine habitats and vice versa	No impact on river morphology and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Population structure of juveniles. At least three age / size groups present	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	predator aggregation. See **Section 3.26.1**			
Juvenile density in fine sediment. Juvenile density at least 1 / m²	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.26.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.26.1 Sea lamprey [1095]

1160. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- Population structure of juveniles. At least three age / size groups present; and
- Juvenile density in fine sediment. Juvenile density at least 1 / m².

Increase in underwater noise and vibration

1161. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1162. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1163. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1164. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1165. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1166. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1167. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of

the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1168. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1169. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1170. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1171. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1172. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1173. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

1174. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1175. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1176. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1177. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1178. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1179. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1180. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1181. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1182. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1183. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1184. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1185. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1186. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1187. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1188. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2

- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1189. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

1190. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1191. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1192. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1193. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1194. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1195. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array

- Oriel
- Mona
- Morgan
- Awel-y-Mor

1196. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1197. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1198. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1199. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.27 Lough Gill SAC (IE0001976)

1200. This SAC is 500 km from the offshore development area and is screened in for Sea lamprey, River lamprey and Atlantic Salmon.

1201. The following other plans and projects (**Table 3-66**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-66 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

1202. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-67 Conservation Objectives, Attributes and Targets for Lough Gill SAC and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1095] Sea lamprey (*Petromyzon marinus*)				
Distribution: extent of anadromy. Greater than 75% of main stem length of rivers accessible from estuary	No impact on river morphology and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Annual run size. Annual run size should reflect that expected under near-natural conditions	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	predator aggregation. See **Section 3.27.1**			
Larval lamprey in fine sediment. Larval lamprey present in SAC catchment	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.27.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Extent and distribution of spawning and nursery habitat. No decline in extent and	CWP Project has no connectivity to freshwater spawning habitat and as such no	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
distribution of spawning and nursery beds	potential to affect this attribute and target			predicted from the project in-combination with other plans and projects
[1099] River lamprey (*Lampetra fluviatilis*)				
Distribution. Access to all water courses down to first order streams	No impact on river morphology, and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Distribution in suitable habitat. Not less than 50% of sample sites with suitable habitat positive for larval brook / river lamprey	No impact on river morphology, and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Population structure of larvae. At least three age / size classes of larval brook / river lamprey present	Increase in underwater noise and vibration Presence of EMF	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.27.1**			with other plans and projects
Larval lamprey density in fine sediment. Mean density of brook / river larval lamprey in sites with suitable habitat at least 5 / m²	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Presence of structures and predator aggregation. See **Section 3.27.1**			
Extent and distribution of spawning and nursery habitat. No decline in extent and distribution of spawning and nursery beds	No impact on spawning habitat and thus no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1106] Atlantic salmon (*Salmo salar*)				
Distribution: extent of anadromy. 100% of river channels down to second order accessible from estuary	No impact to river morphology, and as such no impact to this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Adult spawning fish. Conservation limit (CL) for each system consistently exceeded	Increase in underwater noise and vibration	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.27.2**			predicted from the project in-combination with other plans and projects
Salmon fry abundance. Maintain or exceed 0 + fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry / 5 minutes sampling	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.27.2**			
Out-migrating smolt abundance. No significant decline	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation.	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	See **Section 3.27.2**			
Number and distribution of redds. No decline in number and distribution of spawning redds due to anthropogenic causes	No direct connectivity with the SAC and as such no impact possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Water quality. At least Q4 at all sites sampled by EPA	No direct connectivity with the SAC and as such no impact on water quality possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.27.1 Sea lamprey [1095] and River lamprey [1099]

1203. Due to similarities in morphology and sensitivity to the relevant impacts, Sea lamprey and River lamprey are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

1204. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- Annual run size. Annual run size should reflect that expected under near-natural conditions; and
- Larval lamprey in fine sediment. Larval lamprey present in SAC catchment.

1205. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to River lamprey.

- Population structure of larvae. At least three age / size classes of larval brook / river lamprey present; and
- Larval lamprey density in fine sediment. Mean density of brook / river larval lamprey in sites with suitable habitat at least 5 / m^2.

Increase in underwater noise and vibration

1206. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1207. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1208. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1209. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1210. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1211. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1212. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1213. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1214. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1215. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1216. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1217. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1218. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic

fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

1219. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1220. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1221. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1222. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1223. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1224. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1225. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1226. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1227. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1228. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1229. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1230. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1231. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1232. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative

habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1233. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1234. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

1235. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1236. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1237. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1238. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1239. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary

for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1240. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1241. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1242. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1243. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1244. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.27.2 Atlantic salmon [1106]

1245. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- Adult spawning fish. CL for each system consistently exceeded;
- Salmon fry abundance. Maintain or exceed 0 + fry mean catchment - wide abundance threshold value. Currently set at 17 salmon fry / 5 minutes sampling; and
- Out-migrating smolt abundance. No significant decline.

Increase in underwater noise and vibration

1246. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the

SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1247. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1248. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1249. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1250. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1251. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1252. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1253. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1254. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1255. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1256. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1257. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1258. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Armstrong et al. (2015) conducted a review of the potential effects of EMF on Atlantic salmon for Marine Scotland. It determined that salmonids did not exhibit behavioural responses when exposed to EMF levels (up to 95 µT; Armstrong et al., 2015). Furthermore, as a pelagic species that mainly travels in the top levels of the marine environment, interaction with cabling infrastructure is considered highly unlikely for salmon.

1259. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1260. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1261. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1262. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1263. The CWP Project alone assessment concluded that the effect on salmon from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1264. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1265. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1266. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1267. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1268. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to this QI, with effects

constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1269. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1270. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1271. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1272. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1273. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1274. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

1275. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1276. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1277. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1278. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1279. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1280. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1281. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such

scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1282. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1283. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1284. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.28 River Moy SAC (IE0002298)

1285. This SAC is 508 km from the offshore development area and is screened in for Sea lamprey and Atlantic salmon.

1286. The following other plans and projects (**Table 3-68**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-68 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

1287. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-69 Conservation Objectives, Attributes and Targets for River Moy SAC and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1095] Sea lamprey (*Petromyzon marinus*)				
Distribution: extent of anadromy. Greater than 75% of main stem length of rivers accessible from estuary	No impact on river morphology and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Population structure of juvenile. At least three age / size groups present	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	predator aggregation. See **Section 3.28.1**			
Juvenile density in fine sediment. Mean catchment juvenile density at least 1 / m²	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.28.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Extent and distribution of spawning habitat. No decline in extent and distribution of spawning beds	CWP Project has no connectivity to freshwater spawning habitat and as such no	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	potential to affect this attribute and target			predicted from the project in-combination with other plans and projects
Availability of juvenile habitat. More than 50% of sample sites positive	There will be no change in juvenile habitat as a result of the CWP Project, and as such no impact to this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1106] Atlantic salmon (*Salmo salar*)				
Distribution: extent of anadromy. 100% of river channels down to second order accessible from estuary	No impact to river morphology, and as such no impact to this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Adult spawning fish. Conservation Limit (CL) for each system consistently exceeded	Increase in underwater noise and vibration Presence of EMF	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.28.2**			with other plans and projects
Salmon fry abundance. Maintain or exceed 0 + fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry / 5 minutes sampling	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Presence of structures and predator aggregation. See **Section 3.28.2**			
Out-migrating smolt abundance. No significant decline	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.28.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Number and distribution of redds. No decline in number and	No direct connectivity with the	None required	N / A	No impediment to the Conservation Objective being met,

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
distribution of spawning redds due to anthropogenic causes	SAC and as such no impact possible			and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Water quality. At least Q4 at all sites sampled by EPA	No direct connectivity with the SAC and as such no impact on water quality possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.28.1 Sea lamprey [1095]

1288. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea Lamprey.

- Population structure of juveniles. At least three age / size groups present; and
- Juvenile density in fine sediment. Mean catchment juvenile density at least 1 / m².

Increase in underwater noise and vibration

1289. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1290. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1291. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1292. Based upon project alone assessments, the most likely effects to arise from offshore activities are short-term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1293. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1294. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1295. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of

the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1296. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1297. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1298. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1299. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1300. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1301. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick and Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

1302. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1303. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1304. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1305. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1306. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1307. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1308. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1309. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1310. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1311. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1312. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1313. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1314. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1315. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1316. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2

- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1317. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

1318. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1319. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1320. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1321. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1322. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1323. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array

- Oriel
- Mona
- Morgan
- Awel-y-Mor

1324. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1325. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1326. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1327. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.28.2 Atlantic salmon [1106]

1328. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- Adult spawning fish. CL for each system consistently exceeded;
- Salmon fry abundance. Maintain or exceed 0 + fry mean catchment - wide abundance threshold value. Currently set at 17 salmon fry / 5 minutes sampling; and
- Out-migrating smolt abundance. No significant decline.

Increase in underwater noise and vibration

1329. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1330. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low.

Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1331. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1332. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1333. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1334. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1335. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1336. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1337. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1338. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1339. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is

considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1340. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1341. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Armstrong et al. (2015) conducted a review of the potential effects of EMF on Atlantic salmon for Marine Scotland. It determined that salmonids did not exhibit behavioural responses when exposed to EMF levels (up to 95 µT; Armstrong et al., 2015). Furthermore, as a pelagic species that mainly travels in the top levels of the marine environment, interaction with cabling infrastructure is considered highly unlikely for salmon.

1342. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1343. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1344. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1345. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1346. The CWP Project alone assessment concluded that the effect on salmon from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to

avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1347. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1348. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1349. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1350. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1351. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to this QI, with effects constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1352. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1353. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1354. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1355. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1356. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1357. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

1358. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1359. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1360. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1361. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1362. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1363. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1364. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1365. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1366. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1367. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.29 Castlemaine Harbour SAC (IE0000343)

1368. This SAC is 474 km from the offshore development area and is screened in for Sea lamprey, River lamprey and Atlantic salmon.

1369. The following other plans and projects (**Table 3-70**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-70 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

1370. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-71 Conservation Objectives, Attributes and Targets for Castlemaine Harbour SAC and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1095] Sea lamprey (*Petromyzon marinus*)				
Distribution: extent of anadromy. Greater than 75% of main stem length of rivers accessible from estuary	No impact on river morphology and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Population structure of juveniles. At least three age / size groups present	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation.	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	See **Section 3.29.1**			
Juvenile density in fine sediment. Mean catchement juvenile density at least 1 / m²	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.29.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Extent and distribution of spawning habitat. No decline in extent and distribution of spawning beds	CWP Project has no connectivity to freshwater spawning habitat and as such no	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	potential to affect this attribute and target			combination with other plans and projects
Availability of juvenile habitat. More than 50% of sample sites positive	There will be no change in juvenile habitat as a result of the CWP Project, and as such no impact to this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1099] River lamprey (*Lampetra fluviatili*)				
Distribution: extent of anadromy. Greater than 75% of main stem length of rivers accessible from estuary	No impact on river morphology, and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Population structure of juveniles. At least three age / size groups of river / brook lamprey present	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.29.1**			
Juvenile density in fine sediment. Mean catchment juvenile density of brook / river lamprey at least 2 / m^2	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	predator aggregation. See **Section 3.29.1**			
Extent and distribution of spawning habitat. No decline in extent and distribution of spawning beds	No impact on spawning habitat and thus no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Availability of juvenile habitat. More than 50% of sample sites positive	No impact on juvenile habitat, and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1106] Atlantic salmon (*Salmo salar*)				
Distribution: extent of anadromy. 100% of river channels down to second order accessible from estuary. Currently present in 88-100% of sites sampled	No impact to river morphology, and as such no impact to this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Adult spawning fish. Conservation limit (CL) for each system consistently exceeded	Increase in underwater noise and vibration Presence of EMF	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.29.2**			combination with other plans and projects
Salmon fry abundance. Maintain or exceed 0 + fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry / 5 minutes sampling	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.29.2**			
Out-migrating smolt abundance. No significant decline	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation.	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	See **Section 3.29.2**			
Number and distribution of redds. No decline in number and distribution of spawning redds due to anthropogenic causes	No direct connectivity with the SAC and as such no impact on redds possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Water quality. At least Q4 at all sites sampled by EPA. 85% of relevant sites currently at least Q4 on Laune	No direct connectivity with the SAC and as such no impact on water quality possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.29.1 Sea lamprey [1095] and River lamprey [1099]

1371. Due to similarities in morphology and sensitivity to the relevant impacts, Sea lamprey and River lamprey are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

1372. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- Population structure of juveniles. At least three age / size groups present; and
- Juvenile density in fine sediment. Juvenile density at least 1 / m².

1373. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to River lamprey.

- Population structure of juveniles. At least three age / size groups of river / brook lamprey present; and
- Juvenile density in fine sediment. Mean catchment juvenile density of brook / river lamprey at least 2 / m².

Increase in underwater noise and vibration

1374. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1375. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1376. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1377. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1378. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1379. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1380. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1381. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1382. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1383. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1384. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1385. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1386. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic

fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

1387. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1388. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1389. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1390. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1391. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1392. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1393. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1394. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1395. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1396. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1397. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1398. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1399. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1400. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative

habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1401. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1402. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

1403. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1404. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1405. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1406. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1407. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary

for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1408. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1409. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1410. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1411. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1412. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.29.2 Atlantic salmon [1106]

1413. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- Adult spawning fish. CL for each system consistently exceeded;
- Salmon fry abundance. Maintain or exceed 0 + fry mean catchment - wide abundance threshold value. Currently set at 17 salmon fry / 5 minutes sampling; and
- Out-migrating smolt abundance. No significant decline.

Increase in underwater noise and vibration

1414. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the

SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1415. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1416. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1417. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1418. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1419. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1420. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1421. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1422. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1423. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1424. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1425. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1426. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Armstrong et al. (2015) conducted a review of the potential effects of EMF on Atlantic salmon for Marine Scotland. It determined that salmonids did not exhibit behavioural responses when exposed to EMF levels (up to 95 µT; Armstrong et al., 2015). Furthermore, as a pelagic species that mainly travels in the top levels of the marine environment, interaction with cabling infrastructure is considered highly unlikely for salmon.

1427. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1428. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1429. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1430. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1431. The CWP Project alone assessment concluded that the effect on salmon from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1432. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1433. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1434. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1435. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1436. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to this QI, with effects

constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1437. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1438. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1439. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1440. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1441. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1442. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

1443. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1444. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1445. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1446. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1447. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1448. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1449. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such

scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1450. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1451. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1452. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.30 Lower River Shannon SAC (IE0002165)

1453. This SAC is 506 km from the offshore development area and is screened in for Sea lamprey, River lamprey and Atlantic salmon.

1454. The following other plans and projects (**Table 3-72**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-72 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

1455. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-73 Conservation Objectives, Attributes and Targets for Lower River Shannon SAC and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1095] Sea lamprey (*Petromyzon marinus*)				
Distribution: extent of anadromy. Greater than 75% of main stem length of rivers accessible from estuary	No impact on river morphology and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Population structure of juveniles. At least three age / size groups present	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation.	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	See **Section 3.30.1**			
Juvenile density in fine sediment. Juvenile density at least 1 / m²	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.30.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Extent and distribution of spawning habitat. No decline in extent and distribution of spawning beds	CWP Project has no connectivity to freshwater spawning habitat and as such no	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	potential to affect this attribute and target			combination with other plans and projects
Availability of juvenile habitat. More than 50% of sample sites positive	There will be no change in juvenile habitat as a result of the CWP Project, and as such no impact to this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1099] River lamprey (*Lampetra fluviatili*)				
Distribution: Access to all water courses down to first order streams	No impact on river morphology, and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Population structure of juveniles. At least three age / size groups of river / brook lamprey present	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.30.1**			
Juvenile density in fine sediment. Mean catchment juvenile density of brook / river lamprey at least 2 / m²	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	predator aggregation. See **Section 3.30.1**			
Extent and distribution of spawning habitat. No decline in extent and distribution of spawning beds	No impact on spawning habitat and thus no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Availability of juvenile habitat. More than 50% of sample sites positive	No impact on juvenile habitat, and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1106] Atlantic salmon (*Salmo salar*) (only in fresh water)				
Distribution: extent of anadromy. 100% of river channels down to second order accessible from estuary.	No impact to river morphology, and as such no impact to this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Adult spawning fish. Conservation Limit (CL) for each system consistently exceeded	Increase in underwater noise and vibration	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.30.2**			combination with other plans and projects
Salmon fry abundance. Maintain or exceed 0 + fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry / 5 minutes sampling	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.30.2**			
Out-migrating smolt abundance. No significant decline	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation.	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	See **Section 3.30.2**			
Number and distribution of redds. No decline in number and distribution of spawning redds due to anthropogenic causes	No direct connectivity with the SAC and as such no impact on redds possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Water quality. At least Q4 at all sites sampled by EPA.	No direct connectivity with the SAC and as such no impact on water quality possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.30.1 Sea lamprey [1095] and River lamprey [1099]

1456. Due to similarities in morphology and sensitivity to the relevant impacts, Sea lamprey and River lamprey are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

1457. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- Population structure of juveniles. At least three age / size groups present; and
- Juvenile density in fine sediment. Juvenile density at least 1 / m².

1458. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to River lamprey.

- Population structure of juveniles. At least three age / size groups of river / brook lamprey present; and
- Juvenile density in fine sediment. Mean catchment juvenile density of brook / river lamprey at least 2 / m².

Increase in underwater noise and vibration

1459. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1460. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1461. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1462. Based upon project alone assessments, the most likely effects to arise from offshore activities are short-term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1463. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1464. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1465. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1466. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1467. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1468. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1469. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1470. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1471. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic

fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011; Bjerselius et al., 2000, Polkinghorne et al., 2001).

1472. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1473. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1474. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1475. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1476. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals' normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1477. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1478. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1479. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1480. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1481. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1482. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1483. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1484. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1485. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative

habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1486. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1487. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

1488. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1489. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1490. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1491. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1492. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary

for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1493. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1494. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1495. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1496. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1497. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.30.2 Atlantic salmon [1106][33]

1498. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- Adult spawning fish. CL for each system consistently exceeded;
- Salmon fry abundance. Maintain or exceed 0 + fry mean catchment - wide abundance threshold value. Currently set at 17 salmon fry / 5 minutes sampling; and

[33] Freshwater Pearl Mussel (FWPM) are dependent on salmonid individuals on which their larvae develop during a parasitic phase. As such it is considered that where the potential for adverse effects on site integrity through effects on salmon can be ruled out, it can be similarly ruled out for FWPM where they are QIs of the same SAC. Conversely, should adverse effects on site integrity not be ruled out due to effects on salmon for a given European Site, neither shall it be ruled out on FWPM where both are QIs of the same SAC. Accordingly, FWPM are not listed here or elsewhere in the NIS as separate receptors.

- Out-migrating smolt abundance. No significant decline.

Increase in underwater noise and vibration

1499. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1500. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1501. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1502. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1503. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1504. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1505. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1506. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1507. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1508. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1509. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1510. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1511. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Armstrong et al. (2015) conducted a review of the potential effects of EMF on Atlantic salmon for Marine Scotland. It determined that salmonids did not exhibit behavioural responses when exposed to EMF levels (up to 95 µT; Armstrong et al., 2015). Furthermore, as a pelagic species that mainly travels in the top levels of the marine environment, interaction with cabling infrastructure is considered highly unlikely for salmon.

1512. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1513. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1514. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1515. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1516. The CWP Project alone assessment concluded that the effect on salmon from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1517. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1518. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1519. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1520. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when

considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1521. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to this QI, with effects constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1522. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1523. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1524. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1525. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1526. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1527. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a

negligible spatial extent of the QIs marine phase when 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.

1528. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1529. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1530. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1531. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1532. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1533. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1534. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are

travelling to feeding grounds or towards natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1535. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1536. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1537. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.31 Lough Corrib SAC (IE0000297)

1538. This SAC is 623 km from the offshore development area and is screened in for Sea lamprey and Atlantic salmon.

1539. The following other plans and projects (**Table 3-74**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-74 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

1540. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-75 Conservation Objectives, Attributes and Targets for Lough Corrib SAC and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1095] Sea lamprey (*Petromyzon marinus*)				
Distribution: extent of anadromy. Greater than 75% of main stem length of rivers accessible from estuary	No impact on river morphology and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Population structure of juveniles. At least three age / size groups present	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation.	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	See **Section 3.31.1**			
Juvenile density in fine sediment. Mean catchment juvenile density at least 1 / m²	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.31.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Extent and distribution of spawning habitat. No decline in extent and distribution of spawning beds	CWP Project has no connectivity to freshwater spawning habitat and as such no	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	potential to affect this attribute and target			combination with other plans and projects
Availability of juvenile habitat. More than 50% of sample sites positive, with a minimum of four positive sites in a catchment, which are at least 5 km apart	There will be no change in juvenile habitat as a result of the CWP Project, and as such no impact to this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1106] Atlantic salmon (*Salmo salar*) (only in fresh water)				
Distribution: extent of anadromy. 100% of river channels down to second order accessible from estuary.	No impact to river morphology, and as such no impact to this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Adult spawning fish. Conservation Limit (CL) for each system consistently exceeded	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.31.2**			
Salmon fry abundance. Maintain or exceed 0 + fry mean catchment-wide abundance threshold value. Currently set at 17 salmon fry / 5 minutes sampling	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	predator aggregation. See **Section 3.31.2**			
Out-migrating smolt abundance. No significant decline	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.31.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
Number and distribution of redds. No decline in number and distribution of spawning redds due to anthropogenic causes	No direct connectivity with the SAC and as such no impact on redds possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Water quality. At least Q4 at all sites sampled by EPA.	No direct connectivity with the SAC and as such no impact on water quality possible	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.31.1 Sea lamprey [1095]

1541. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- Population structure of juveniles. At least three age / size groups present; and
- Juvenile density in fine sediment. Mean catchment juvenile density at least 1 / m².

Increase in underwater noise and vibration

1542. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1543. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1544. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1545. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1546. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1547. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1548. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of

the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1549. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1550. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1551. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1552. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1553. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1554. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

1555. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1556. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1557. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1558. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1559. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1560. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1561. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1562. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1563. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1564. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1565. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1566. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1567. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1568. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1569. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2

- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1570. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

1571. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1572. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1573. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1574. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1575. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1576. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array

- Oriel
- Mona
- Morgan
- Awel-y-Mor

1577. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1578. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1579. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1580. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.31.2 Atlantic salmon [1106][34]

1581. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- Adult spawning fish. CL for each system consistently exceeded;
- Salmon fry abundance. Maintain or exceed 0 + fry mean catchment - wide abundance threshold value. Currently set at 17 salmon fry / 5 minutes sampling; and
- Out-migrating smolt abundance. No significant decline.

Increase in underwater noise and vibration

1582. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded

[34] Freshwater Pearl Mussel (FWPM) are dependent on salmonid individuals on which their larvae develop during a parasitic phase. As such it is considered that where the potential for adverse effects on site integrity through effects on salmon can be ruled out, it can be similarly ruled out for FWPM where they are QIs of the same SAC. Conversely, should adverse effects on site integrity not be ruled out due to effects on salmon for a given European Site, neither shall it be ruled out on FWPM where both are QIs of the same SAC. Accordingly, FWPM are not listed here or elsewhere in the NIS as separate receptors.

beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1583. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1584. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1585. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1586. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1587. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1588. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1589. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1590. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1591. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal

behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1592. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1593. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1594. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Armstrong et al. (2015) conducted a review of the potential effects of EMF on Atlantic salmon for Marine Scotland. It determined that salmonids did not exhibit behavioural responses when exposed to EMF levels (up to 95 µT; Armstrong et al., 2015). Furthermore, as a pelagic species that mainly travels in the top levels of the marine environment, interaction with cabling infrastructure is considered highly unlikely for salmon.

1595. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1596. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1597. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1598. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1599. The CWP Project alone assessment concluded that the effect on salmon from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1600. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1601. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1602. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1603. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1604. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to this QI, with effects constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1605. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1606. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1607. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1608. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1609. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1610. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

1611. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1612. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1613. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1614. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1615. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1616. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1617. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1618. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with

no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1619. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1620. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.32 Pembrokeshire Marine / Sir Benfro Forol (UK0013116)

1621. This SAC is 117 km from the offshore development area and is screened in for Sea lamprey, River lamprey, Twaite shad and Allis shad.

1622. The following other plans and projects (**Table 3-76**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-76 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

1623. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-77 Conservation Objectives, Attributes and Targets for Pembrokeshire Marine / Sir Benfro Forol and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect (Project alone)	Conclusion
[1095] Sea lamprey (*Petromyzon marinus)* *Conservation Objective: To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.*				
Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site.	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.32.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future	Increase in underwater noise and vibration Presence of EMF	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with

Attributes and targets	Predicted effect	Mitigation	Residual effect (Project alone)	Conclusion
	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.32.1**			other plans and projects
Supporting habitats and species. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics of the species within the site and population beyond the site is stable or increasing	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.32.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

[1099] River lamprey (*Lampetra fluviatilis*)

Conservation Objective: To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.

Attributes and targets	Predicted effect	Mitigation	Residual effect (Project alone)	Conclusion
Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site.	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.32.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation.	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (Project alone)	Conclusion
	See **Section 3.32.1**			
Supporting habitats and species. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics of the species within the site and population beyond the site is stable or increasing.	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.32.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Twaite shad [1103] *Conservation Objective: To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.*				
Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with

Attributes and targets	Predicted effect	Mitigation	Residual effect (Project alone)	Conclusion
	Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.32.2**			other plans and projects
Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.32.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Supporting habitats and species. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics of the species within the site and population	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with

Attributes and targets	Predicted effect	Mitigation	Residual effect (Project alone)	Conclusion
beyond the site is stable or increasing	Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.32.2**			other plans and projects
[1102] Allis shad (Alosa alosa) *Conservation Objective: To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.*				
Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site.	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.32.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Range. The species population within the site is such that the natural range of the population is	Increase in underwater noise and vibration	None required	N / A	No impediment to the Conservation Objective being met,

Attributes and targets	Predicted effect	Mitigation	Residual effect (Project alone)	Conclusion
not being reduced or likely to be reduced for the foreseeable future	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.32.2**			and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Supporting habitats and species. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics of the species within the site and population beyond the site is stable or increasing	Increase in underwater noise and vibratio Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.32.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.32.1 Sea lamprey [1095] and River lamprey [1099]

1624. Due to similarities in morphology and sensitivity to the relevant impacts, Sea lamprey and River lamprey are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

1625. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site.
- Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.
- Supporting habitats and species. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics of the species within the site and population beyond the site is stable or increasing.

1626. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to River lamprey.

- Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site.
- Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.
- Supporting habitats and species. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics of the species within the site and population beyond the site is stable or increasing.

Increase in underwater noise and vibration

1627. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1628. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1629. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1630. Based upon project alone assessments, the most likely effects to arise from offshore activities are short-term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are

considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1631. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1632. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1633. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1634. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1635. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1636. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1637. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1638. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array

- Oriel
- Mona
- Morgan
- Awel-y-Mor

1639. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

1640. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1641. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1642. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1643. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1644. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects

predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1645. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1646. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1647. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1648. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1649. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1650. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1651. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1652. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or

surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1653. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1654. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1655. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

1656. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1657. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1658. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1659. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1660. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1661. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1662. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1663. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1664. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1665. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.32.2 Twaite shad [1103] and Allis shad [1102]

1666. Due to similarities in morphology and sensitivity to the relevant impacts, Twaite shad and Allis shad are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

1667. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Twaite shad.

- Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site.
- Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.
- Supporting habitats and species. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics of the species within the site and population beyond the site is stable or increasing.

1668. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Allis shad.

- Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site.
- Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.
- Supporting habitats and species. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics of the species within the site and population beyond the site is stable or increasing.

Increase in underwater noise and vibration

1669. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1670. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1671. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1672. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1673. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1674. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1675. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1676. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1677. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1678. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1679. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1680. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1681. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). It is considered that shad may be able to detect low level induced electric fields, however there is no evidence to suggest that EMF plays a role in migration for these species. Furthermore, as a pelagic species, interaction with cable infrastructure is considered highly unlikely for shad.

1682. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1683. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1684. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1685. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1686. The CWP Project alone assessment concluded that the effect on shad from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1687. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and

as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1688. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1689. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1690. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1691. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1692. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1693. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1694. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1695. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore

development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1696. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1697. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

1698. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1699. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1700. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1701. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1702. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and

the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1703. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1704. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1705. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1706. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1707. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.33 Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd (UK0020020)

1708. This SAC is 191 km from the offshore development area and is screened in for Sea lamprey, River lamprey, Twaite shad and Allis shad.

1709. The following other plans and projects (**Table 3-78**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-78 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

1710. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-79 Conservation Objectives, Attributes and Targets for Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd SAC and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1095] Sea lamprey (*Petromyzon marinus)* *Conservation Objective: To restore the favourable conservation condition of the Qualifying Feature in the SAC, which is defined by the following list of attributes and targets:*				
Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.33.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.33.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Supporting habitats and species. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics within the site and population beyond the site is stable or increasing	Increase in underwater noise and vibration Presence of EMF	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.33.1**			combination with other plans and projects
[1099] River lamprey (*Lampetra fluviatilis*) *Conservation Objective: To restore the favourable conservation condition of the Qualifying Feature in the SAC, which is defined by the following list of attributes and targets:*				
Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.33.1**			
Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation.	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	See **Section 3.33.1**			
Supporting habitats and species. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics within the site and population beyond the site is stable or increasing	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.33.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1103] Twaite shad (*Alosa fallax)* *Conservation Objective: To restore the favourable conservation condition of Twaite shad in the SACs, which is defined by the following list of attributes and targets:*				

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.33.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future	Increase in underwater noise and vibration Presence of EMF	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.33.2**			combination with other plans and projects
Supporting habitats and species. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics within the site and population beyond the site is stable or increasing	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Presence of structures and predator aggregation. See **Section 3.33.2**			
[1102] Allis shad *(Alosa alosa)* *Conservation Objective: To restore the favourable conservation condition of Allis shad in the SACs, which is defined by the following list of attributes and targets:*				
Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation.	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	See **Section 3.33.2**			
Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.33.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Supporting habitats and species. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics within the site and population beyond the site is stable or increasing	Increase in underwater noise and vibration Presence of EMF	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.33.2**			predicted from the project in-combination with other plans and projects

3.33.1 Sea lamprey [1095] and River lamprey [1099]

1711. Due to similarities in morphology and sensitivity to the relevant impacts, Sea lamprey and River lamprey are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

1712. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site.
- Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.
- Supporting habitats and species. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics within the site and population beyond the site is stable or increasing.

1713. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to River lamprey.

- Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site.
- Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.
- Supporting habitats and species. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics within the site and population beyond the site is stable or increasing.

Increase in underwater noise and vibration

1714. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1715. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1716. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1717. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other

projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1718. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1719. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1720. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1721. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1722. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1723. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1724. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1725. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona

- Morgan
- Awel-y-Mor

1726. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011; Bjerselius et al., 2000; Polkinghorne et al., 2001).

1727. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1728. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1729. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1730. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1731. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that

there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1732. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1733. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1734. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1735. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1736. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1737. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1738. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1739. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted

to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1740. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1741. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1742. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

1743. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1744. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1745. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1746. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1747. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1748. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1749. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1750. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1751. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1752. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.33.2 Twaite shad [1103] and Allis shad [1102]

1753. Due to similarities in morphology and sensitivity to the relevant impacts, Twaite shad and Allis shad are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

1754. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Twaite shad.

- Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site.
- Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.
- Supporting habitats and species. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics within the site and population beyond the site is stable or increasing.

1755. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Allis shad.

- Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site.
- Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.
- Supporting habitats and species. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics within the site and population beyond the site is stable or increasing.

Increase in underwater noise and vibration

1756. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1757. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1758. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1759. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability

of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1760. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1761. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1762. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1763. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1764. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1765. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1766. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1767. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan

- Awel-y-Mor

1768. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). It is considered that shad may be able to detect low level induced electric fields, however there is no evidence to suggest that EMF plays a role in migration for these species. Furthermore, as a pelagic species, interaction with cable infrastructure is considered highly unlikely for shad.

1769. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1770. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1771. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1772. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1773. The CWP Project alone assessment concluded that the effect on shad from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1774. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1775. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1776. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1777. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1778. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1779. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1780. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1781. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP

Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1782. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1783. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1784. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

1785. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1786. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1787. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1788. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1789. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine

environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1790. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1791. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1792. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1793. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1794. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.34 Afon Tywi / River Tywi (UK0013010)

1795. This SAC is 242 km from the offshore development area and is screened in for Sea lamprey, River lamprey, Twaite shad and Allis shad.

1796. The following other plans and projects (**Table 3-80**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-80 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

1797. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-81 Conservation Objectives, Attributes and Targets for Afon Tywi / River Tywi and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect (project alone)	Conclusion
[1095] Sea lamprey (*Petromyzon marinus)* *Conservation Objective:*				
The distribution of the population should be being maintained or where appropriate increasing	No impact on river morphology and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
There should be sufficient habitat, of sufficient quality, to support the population in the long term	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.34.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (project alone)	Conclusion
The size of the population should be stable or increasing, allowing for natural variability, and sustainable in the long term	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.34.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Factors affecting the population or its habitat should be under appropriate control	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation.	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (project alone)	Conclusion
	See **Section 3.34.1**			
[1099] River lamprey (*Lampetra fluviatilis*) *Conservation Objective:*				
The distribution of the population should be being maintained or where appropriate increasing	No impact on river morphology, and as such no impact on this attribute and target.	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
There should be sufficient habitat, of sufficient quality, to support the population in the long term	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.34.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (project alone)	Conclusion
The size of the population should be stable or increasing, allowing for natural variability, and sustainable in the long term	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.34.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Factors affecting the population or its habitat should be under appropriate control	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation.	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (project alone)	Conclusion
	See **Section 3.34.1**			
[1103] Twaite shad (*Alosa fallax)* *Conservation Objective:*				
The distribution of the population should be being maintained or where appropriate increasing	No impact on river morphology, and as such no impact on the attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
There should be sufficient habitat, of sufficient quality, to support the population in the long term	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.34.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (project alone)	Conclusion
The size of the population should be stable or increasing, allowing for natural variability, and sustainable in the long term	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.34.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Factors affecting the population or its habitat should be under appropriate control	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation.	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (project alone)	Conclusion
	See **Section 3.34.2**			
[1102] Allis shad *(Alosa alosa)* *Conservation Objective:*				
The distribution of the population should be being maintained or where appropriate increasing	No impact on river morphology, and as such no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
There should be sufficient habitat, of sufficient quality, to support the population in the long term	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.34.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (project alone)	Conclusion
The size of the population should be stable or increasing, allowing for natural variability, and sustainable in the long term	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.34.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Factors affecting the population or its habitat should be under appropriate control	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.34.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.34.1 Sea lamprey [1095] and River lamprey [1099]

1798. Due to similarities in morphology and sensitivity to the relevant impacts, Sea lamprey and River lamprey are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

1799. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- There should be sufficient habitat, of sufficient quality, to support the population in the long term;
- The size of the population should be stable or increasing, allowing for natural variability, and sustainable in the long term; and
- Factors affecting the population or its habitat should be under appropriate control.

1800. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to River lamprey.

- There should be sufficient habitat, of sufficient quality, to support the population in the long term;
- The size of the population should be stable or increasing, allowing for natural variability, and sustainable in the long term; and
- Factors affecting the population or its habitat should be under appropriate control.

Increase in underwater noise and vibration

1801. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1802. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1803. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1804. Based upon project alone assessments, the most likely effects to arise from offshore activities are short-term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1805. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly

unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1806. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1807. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1808. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1809. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1810. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1811. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1812. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1813. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011; Bjerselius et al., 2000, Polkinghorne et al., 2001).

1814. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1815. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1816. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1817. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1818. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1819. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP

Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1820. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1821. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1822. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1823. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1824. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1825. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1826. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1827. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore

development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1828. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1829. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

1830. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1831. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1832. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1833. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1834. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and

the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1835. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1836. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1837. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1838. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.34.2 Twaite shad [1103] and Allis shad [1102]

1839. Due to similarities in morphology and sensitivity to the relevant impacts, Twaite shad and Allis shad are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

1840. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Twaite shad.

- There should be sufficient habitat, of sufficient quality, to support the population in the long term
- The size of the population should be stable or increasing, allowing for natural variability, and sustainable in the long term; and
- Factors affecting the population or its habitat should be under appropriate control.

1841. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Allis shad.

- There should be sufficient habitat, of sufficient quality, to support the population in the long term;
- The size of the population should be stable or increasing, allowing for natural variability, and sustainable in the long term; and
- Factors affecting the population or its habitat should be under appropriate control.

Increase in underwater noise and vibration

1842. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1843. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1844. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1845. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1846. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1847. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1848. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1849. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1850. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1851. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1852. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1853. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1854. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). It is considered that shad may be able to detect low level induced electric fields, however there is no evidence to suggest that EMF plays a role in migration for these species. Furthermore, as a pelagic species, interaction with cable infrastructure is considered highly unlikely for shad.

1855. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1856. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation

Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1857. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1858. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1859. The CWP Project alone assessment concluded that the effect on shad from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1860. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1861. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1862. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1863. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the

distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1864. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1865. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1866. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1867. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1868. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1869. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1870. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

1871. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1872. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1873. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1874. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1875. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1876. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1877. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be

present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1878. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1879. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1880. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.35 Severn Estuary / Môr Hafren (UK0013030)

1881. This SAC is 301 km from the offshore development area and is screened in for Sea lamprey, River lamprey and Twaite shad.

1882. The following other plans and projects (**Table 3-82**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-82 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

1883. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-83 Conservation Objectives, Attributes and Targets for Severn Estuary / Môr Hafren SAC and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1095] Sea lamprey (*Petromyzon marinus*) *Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*				
The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.35.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
The structure and function of the habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.35.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments Presence of structures and predator aggregation. See **Section 3.35.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The populations of qualifying species, and distribution of qualifying species within the site	Increase in underwater noise and vibration Presence of EMF	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.35.1**			predicted from the project in-combination with other plans and projects
[1099] River lamprey (*Lampetra fluviatilis*) *Conservation Objective:* Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:				
The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.35.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
				adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function of the habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.35.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.35.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
				other plans and projects
The populations of qualifying species, and distribution of qualifying species within the site	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.35.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

[1103] Twaite shad (*Alosa fallax*)

Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	See **Section 3.35.1**			project in-combination with other plans and projects
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function of the habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.35.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.35.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The populations of qualifying species, and distribution of qualifying species within the site	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.35.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.35.1 Sea lamprey [1095] and River lamprey [1099]

1884. Due to similarities in morphology and sensitivity to the relevant impacts, Sea lamprey and River lamprey are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

1885. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and distribution of qualifying species within the site.

1886. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to River lamprey.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and distribution of qualifying species within the site.

Increase in underwater noise and vibration

1887. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1888. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1889. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1890. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1891. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1892. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1893. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1894. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1895. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1896. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1897. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1898. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1899. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick and Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

1900. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1901. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1902. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1903. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1904. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1905. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted

to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1906. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1907. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1908. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1909. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1910. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1911. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1912. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1913. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1914. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1915. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

1916. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1917. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1918. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1919. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1920. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project

from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1921. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1922. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or towards natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1923. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1924. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1925. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.35.2 Twaite shad [1103]

1926. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and distribution of qualifying species within the site.

Increase in underwater noise and vibration

1927. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1928. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1929. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1930. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1931. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1932. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1933. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1934. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1935. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1936. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1937. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1938. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1939. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). It is considered that shad may be able to detect low level induced electric fields, however there is no evidence to suggest that EMF plays a role in migration for these species. Furthermore, as a pelagic species, interaction with cable infrastructure is considered highly unlikely for shad.

1940. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1941. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1942. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1943. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1944. The CWP Project alone assessment concluded that the effect on shad from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1945. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1946. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1947. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1948. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1949. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects

constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1950. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1951. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1952. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1953. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1954. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1955. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

1956. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1957. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1958. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

1959. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

1960. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1961. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1962. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such

scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

1963. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1964. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1965. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.36 River Usk / Afon Wysg (UK0013007)

1966. This SAC is 327 km from the offshore development area and is screened in for River lamprey and Allis shad.

1967. The following other plans and projects (**Table 3-84**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-84 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1
Eirgrid Plc – Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

1968. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-85 Conservation Objectives, Attributes and Targets for River Usk / Afon Wysg SAC and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1099] River lamprey (*Lampetra fluviatilis*) *Conservation Objective: To restore the favourable conservation condition of the Qualifying Feature in the SAC, which is defined by the following list of attributes and targets:*				
The population of the feature in the SAC is stable or increasing over the long term	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.36.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The natural range of the feature in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.36.1**			combination with other plans and projects
Maintain a sufficiently large habitat to maintain the feature's population in the SAC on a long-term basis	No direct or indirect impact on SAC habitats and thus no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1102] Allis shad *(Alosa alosa)* *Conservation Objective: To restore the favourable conservation condition of the Qualifying Feature in the SAC, which is defined by the following list of attributes and targets:*				
The population of the feature in the SAC is stable or increasing over the long term	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.36.2**			predicted from the project in-combination with other plans and projects
The natural range of the feature in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.36.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Maintain a sufficiently large habitat to maintain the feature's population in the SAC on a long-term basis	No direct or indirect impact on SAC habitat, and therefore no impact on this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
				predicted from the project in-combination with other plans and projects

3.36.1 River lamprey [1099]

1969. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- The population of the feature in the SAC is stable or increasing over the long term; and
- The natural range of the feature in the SAC is neither being reduced nor is likely to be reduced for the foreseeable future.

Increase in underwater noise and vibration

1970. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

1971. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1972. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

1973. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

1974. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

1975. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

1976. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of

the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1977. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1978. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

1979. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

1980. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1981. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1982. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

1983. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

1984. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1985. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1986. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

1987. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

1988. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1989. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

1990. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

1991. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

1992. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

1993. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

1994. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

1995. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

1996. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

1997. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2

- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

1998. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

1999. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2000. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2001. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

2002. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

2003. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2004. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array

- Oriel
- Mona
- Morgan
- Awel-y-Mor

2005. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

2006. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2007. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2008. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.36.2 Allis shad [1103]

2009. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- The population of the feature in the SAC is stable or increasing over the long term.

Increase in underwater noise and vibration

2010. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

2011. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and

as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2012. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

2013. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

2014. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

2015. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

2016. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2017. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2018. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

2019. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

2020. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project,

and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2021. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2022. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). It is considered that shad may be able to detect low level induced electric fields, however there is no evidence to suggest that EMF plays a role in migration for these species. Furthermore, as a pelagic species, interaction with cable infrastructure is considered highly unlikely for shad.

2023. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

2024. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2025. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2026. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

2027. The CWP Project alone assessment concluded that the effect on shad from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory

species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

2028. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2029. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

2030. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

2031. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

2032. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2033. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2034. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

2035. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2036. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

2037. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2038. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

2039. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2040. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2041. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

2042. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

2043. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2044. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2045. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

2046. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2047. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2048. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.37 River Wye / Afon Gwy SAC (UK0012642)

2049. This SAC is 349 km from the offshore development area and is screened in for Sea lamprey, River lamprey, Twaite shad, Allis shad and Atlantic salmon.

2050. The following other plans and projects (**Table 3-86**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-86 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

2051. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-87 Conservation Objectives, Attributes and Targets for River Wye / Afon Gwy SAC and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1095] Sea lamprey (*Petromyzon marinus)* *Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*				
The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.37.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function of the habitats of qualifying species	Presence of EMF	None required	N / A	No impediment to the Conservation

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.37.1**			Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments Presence of structures and predator aggregation. See **Section 3.37.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The populations of qualifying species, and distribution of qualifying species within the site	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.37.1**			combination with other plans and projects
[1099] River lamprey (*Lampetra fluviatilis*) *Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*				
The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.37.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
				project in-combination with other plans and projects
The structure and function of the habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.37.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments Presence of structures and predator aggregation. See **Section 3.37.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
The populations of qualifying species, and distribution of qualifying species within the site	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.37.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1103] Twaite shad (*Alosa fallax)* *Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*				
The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.37.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function of the habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.37.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments Presence of structures and predator aggregation.	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	See **Section 3.37.2**			predicted from the project in-combination with other plans and projects
The populations of qualifying species, and distribution of qualifying species within the site	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.37.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1102] Allis shad *(Alosa alosa)* *Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*				
The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Direct impacts on habitats See **Section 3.37.2**			site integrity predicted from the project in-combination with other plans and projects
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function of the habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.37.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments Presence of structures and predator aggregation. See **Section 3.37.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The populations of qualifying species, and distribution of qualifying species within the site	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.37.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1106] Atlantic salmon (*Salmo salar*)				

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:				
The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.37.3**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function of the habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.37.3**			site integrity predicted from the project in-combination with other plans and projects
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments Presence of structures and predator aggregation. See **Section 3.37.3**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The populations of qualifying species, and distribution of qualifying species within the site	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Presence of structures and predator aggregation. See **Section 3.37.3**			

3.37.1 Sea lamprey [1095] and River lamprey [1099]

2052. Due to similarities in morphology and sensitivity to the relevant impacts, Sea lamprey and River lamprey are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

2053. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and distribution of qualifying species within the site.

2054. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to River lamprey.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and distribution of qualifying species within the site.

Increase in underwater noise and vibration

2055. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

2056. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2057. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

2058. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

2059. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

2060. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

2061. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2062. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2063. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

2064. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

2065. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2066. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2067. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

2068. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

2069. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2070. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2071. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

2072. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

2073. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted

to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2074. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

2075. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

2076. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

2077. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2078. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2079. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

2080. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2081. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

2082. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2083. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

2084. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2085. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2086. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

2087. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

2088. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project

from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2089. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2090. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

2091. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2092. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2093. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.37.2 Twaite shad [1103] and Allis shad [1102]

2094. Due to similarities in morphology and sensitivity to the relevant impacts, Twaite shad and Allis shad are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

2095. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Twaite shad.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;

- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and distribution of qualifying species within the site.

2096. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Allis shad.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and distribution of qualifying species within the site.

Increase in underwater noise and vibration

2097. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

2098. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2099. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

2100. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

2101. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

2102. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

2103. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2104. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2105. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

2106. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

2107. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2108. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2109. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). It is considered that shad may be able to detect low level induced electric fields, however there is no evidence to suggest that EMF plays a role in migration for these species. Furthermore, as a pelagic species, interaction with cable infrastructure is considered highly unlikely for shad.

2110. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to

occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

2111. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2112. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

2113. The CWP Project alone assessment concluded that the effect on shad from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

2114. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2115. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

2116. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

2117. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

2118. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2119. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2120. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

2121. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2122. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

2123. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2

- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2124. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

2125. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2126. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2127. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

2128. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

2129. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2130. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array

- Oriel
- Mona
- Morgan
- Awel-y-Mor

2131. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

2132. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2133. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2134. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.37.3 Atlantic salmon [1106]

2135. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and distribution of qualifying species within the site.

Increase in underwater noise and vibration

2136. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

2137. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding

waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2138. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

2139. Based upon project alone assessments, the most likely effects to arise from offshore activities are short-term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

2140. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

2141. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

2142. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2143. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2144. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

2145. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

2146. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted

to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2147. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2148. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Armstrong et al. (2015) conducted a review of the potential effects of EMF on Atlantic salmon for Marine Scotland. It determined that salmonids did not exhibit behavioural responses when exposed to EMF levels (up to 95 µT; Armstrong et al., 2015). Furthermore, as a pelagic species that mainly travels in the top levels of the marine environment, interaction with cabling infrastructure is considered highly unlikely for salmon.

2149. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

2150. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2151. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2152. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

2153. The CWP Project alone assessment concluded that the effect on salmon from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP

Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

2154. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2155. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

2156. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

2157. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

2158. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to this QI, with effects constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2159. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2160. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

2161. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2162. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

2163. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2164. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

2165. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2166. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2167. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

2168. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

2169. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2170. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2171. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

2172. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2173. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2174. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.38 Afon Teifi / River Teifi (UK0012670)

2175. This SAC is 121 km from the offshore development area and is screened in for Sea lamprey, River lamprey and Atlantic salmon.

2176. The following other plans and projects (**Table 3-88**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-88 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

2177. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-89 Conservation Objectives, Attributes and Targets for Afon Teifi / River Teifi and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect (Project alone)	Conclusion
[1095] Sea lamprey (*Petromyzon marinus*) *Conversation Objective: The vision for these features is for them to be in a favourable conservation status, where all of the following conditions are satisfied:*				
Distribution within catchment. Suitable habitat adjacent to or downstream of suitable spawning sites should contain *Petromyzon* ammocoetes; spawning adults to be reported from units 1 – 2 in at least 5 years out of 6	CWP Project has no connectivity to SAC habitat and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Ammocoete density. Ammocoetes should be present in at least four sampling sites each not less than 5 km apart	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation.	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (Project alone)	Conclusion
	See **Section 3.38.1**			
[1099] River lamprey (*Lampetra fluviatilis*) *Conversation Objective: The vision for these features is for them to be in a favourable conservation status, where all of the following conditions are satisfied:*				
Age / size structure of ammocoete population. Samples < 50 ammocoetes contain at least 2 size classes; samples of > 50 ammocoetes at least 3 size classes	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.38.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Distribution of ammocoetes within catchment. Present at not less than 2 / 3 of sites surveyed within natural range; no reduction in distribution of ammocoetes	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (Project alone)	Conclusion
	Presence of structures and predator aggregation. See **Section 3.38.1**			
Ammocoete density. Optimal habitat: > 10 m^{-2}; overall catchment mean: > 5 m^{-2}	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.38.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1106] Atlantic salmon (*Salmo salar*) *Conversation Objective: The vision for these features is for them to be in a favourable conservation status, where all of the following conditions are satisfied:*				
Adult run size. Conservation Limit complied with at least four years in five	Increase in underwater noise and vibration Presence of EMF	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted

Attributes and targets	Predicted effect	Mitigation	Residual effect (Project alone)	Conclusion
	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.38.2**			from the project in-combination with other plans and projects
Juvenile densities. Expected densities for each sample site using HABSCORE	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.38.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.38.1 Sea lamprey [1095] and River lamprey [1099]

2178. Due to similarities in morphology and sensitivity to the relevant impacts, Sea lamprey and River lamprey are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

2179. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- Ammocoete density. Ammocoetes should be present in at least four sampling sites each not less than 5 km apart.

2180. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to River lamprey.

- Distribution of ammocoetes within catchment. Present at not less than 2 / 3 of sites surveyed within natural range; no reduction in distribution of ammocoetes
- Age / size structure of ammocoete population. Samples < 50 ammocoetes contain at least 2 size classes; samples of > 50 ammocoetes at least 3 size classes; and
- Ammocoete density. Optimal habitat: > 10 m^{-2}; overall catchment mean: > 5 m^{-2}.

Increase in underwater noise and vibration

2181. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

2182. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2183. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

2184. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

2185. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of

suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

2186. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

2187. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2188. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2189. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

2190. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

2191. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2192. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2193. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

2194. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

2195. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2196. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2197. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

2198. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

2199. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP

Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2200. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

2201. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

2202. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

2203. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2204. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2205. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

2206. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2207. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore

development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

2208. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2209. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

2210. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2211. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2212. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

2213. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

2214. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and

the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2215. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2216. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

2217. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2218. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2219. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.38.2 Atlantic salmon [1106]

2220. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- Adult run size. Conservation Limit complied with at least four years in five; and
- Juvenile densities. Expected densities for each sample site using HABSCORE.

Increase in underwater noise and vibration

2221. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid

recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

2222. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2223. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

2224. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

2225. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

2226. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

2227. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2228. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2229. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

2230. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts

present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

2231. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2232. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2233. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Armstrong et al. (2015) conducted a review of the potential effects of EMF on Atlantic salmon for Marine Scotland. It determined that salmonids did not exhibit behavioural responses when exposed to EMF levels (up to 95 µT; Armstrong et al., 2015). Furthermore, as a pelagic species that mainly travels in the top levels of the marine environment, interaction with cabling infrastructure is considered highly unlikely for salmon.

2234. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

2235. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2236. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2237. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

2238. The CWP Project alone assessment concluded that the effect on salmon from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

2239. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2240. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

2241. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

2242. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

2243. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to this QI, with effects constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2244. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2245. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

2246. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2247. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

2248. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2249. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

2250. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2251. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2252. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

2253. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

2254. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2255. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2256. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

2257. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with

no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2258. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2259. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.39 Dee Estuary / Aber Dyfrdwy (UK0030131)

2260. This SAC is 162 km from the offshore development area and is screened in for Sea lamprey and River lamprey.

2261. The following other plans and projects (**Table 3-90**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-90 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

2262. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-91 Conservation Objectives, Attributes and Targets for Dee Estuary / Aber Dyfrdwy SAC and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1095] Sea lamprey (*Petromyzon marinus*) *Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*				
The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.39.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function of the habitats of qualifying species	Presence of EMF	None required	N / A	No impediment to the Conservation

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.39.1**			Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments Presence of structures and predator aggregation. See **Section 3.39.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The populations of qualifying species, and distribution of qualifying species within the site	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.39.1**			combination with other plans and projects
[1099] River lamprey (*Lampetra fluviatilis*) *Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*				
The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.39.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
				predicted from the project in-combination with other plans and projects
The structure and function of the habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.39.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments Presence of structures and predator aggregation. See **Section 3.39.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
The populations of qualifying species, and distribution of qualifying species within the site	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.39.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.39.1 Sea lamprey [1095] and River lamprey [1099]

2263. Due to similarities in morphology and sensitivity to the relevant impacts, Sea lamprey and River lamprey are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

2264. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and distribution of qualifying species within the site.

2265. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to River lamprey.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and distribution of qualifying species within the site.

Increase in underwater noise and vibration

2266. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

2267. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2268. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

2269. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

2270. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

2271. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

2272. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2273. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2274. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

2275. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

2276. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2277. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2278. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

2279. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

2280. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2281. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2282. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

2283. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

2284. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted

to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2285. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

2286. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

2287. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

2288. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2289. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2290. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

2291. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2292. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

2293. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2294. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

2295. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2296. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2297. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

2298. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

2299. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project

from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2300. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2301. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

2302. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2303. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2304. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.40 Afonydd Cleddau / Cleddau Rivers (UK0030074)

2305. This SAC is 125 km from the offshore development area and is screened in for Sea lamprey and River lamprey.

2306. The following other plans and projects (**Table 3-92**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-92 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

2307. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-93 Conservation Objectives, Attributes and Targets for Afonydd Cleddau / Cleddau Rivers SAC and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1095] Sea lamprey (*Petromyzon marinus*) *Conservation objective: The vision for this feature is for it to be in a favourable conservation status, where the following are satisfied:*				
Distribution within catchment. Any silt beds adjacent to or downstream of suitable spawning sites should contain *Petromyzon* ammocoetes	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See Sections 2.39.1	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Ammocoete density. Ammocoetes should be present in at least four sampling sites each not less than 5 km apart	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Presence of structures and predator aggregation. See **Section 3.40.1**			
[1099] River lamprey (*Lampetra fluviatilis*) *Conservation objective: The vision for this feature is for it to be in a favourable conservation status, where the following are satisfied:*				
Age / size structure of ammocoete population. Samples < 50 ammocoetes 2 size classes; samples > 50 ammocoetes at least 3 size classes	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.40.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Distribution of ammocoetes within catchment. Present at not less that 2 / 3 of sites surveyed within natural range; no reduction in distribution of ammocoetes	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Presence of structures and predator aggregation. See **Section 3.40.1**			other plans and projects
Ammocoete density. Optimal habitat: > 10 m^{-2}; overall catchment mean: > 5 m^{-2}	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.40.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.40.1 Sea lamprey [1095] and River lamprey [1099]

2308. Due to similarities in morphology and sensitivity to the relevant impacts, Sea lamprey and River lamprey are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

2309. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- Distribution within catchment. Any silt beds adjacent to or downstream of suitable spawning sites should contain Petromyzon ammocoetes; and
- Ammocoete density. Ammocoetes should be present in at least four sampling sites each not less than 5 km apart.

2310. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to River lamprey.

- Age / size structure of ammocoete population. Samples < 50 ammocoetes 2 size classes; samples > 50 ammocoetes at least 3 size classes.
- Distribution of ammocoetes within catchment. Present at not less that 2 / 3 of sites surveyed within natural range; no reduction in distribution of ammocoetes
- Ammocoete density. Optimal habitat: > 10 m^{-2}; overall catchment mean: > 5 m^{-2}.

Increase in underwater noise and vibration

2311. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

2312. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2313. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

2314. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

2315. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly

unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

2316. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

2317. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2318. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2319. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

2320. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

2321. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2322. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2323. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

2324. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

2325. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2326. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2327. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

2328. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

2329. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP

Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2330. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

2331. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

2332. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

2333. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2334. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2335. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

2336. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2337. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore

development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

2338. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2339. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

2340. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2341. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2342. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

2343. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

2344. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and

the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2345. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2346. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

2347. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2348. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2349. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.41 River Dee and Bala Lake / Afon Dyfrdwy a Llyn Tegid (UK0030252)

2350. This SAC is 202 km from the offshore development area and is screened in for Sea lamprey, River lamprey and Atlantic salmon.

2351. The following other plans and projects (**Table 3-94**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-94 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

2352. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-95 Conservation Objectives, Attributes and Targets for River Dee and Bala and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1095] Sea lamprey (*Petromyzon marinus*) *Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*				
The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.41.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function of the habitats of qualifying species	Presence of EMF	None required	N / A	No impediment to the Conservation

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.41.1**			Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments Presence of structures and predator aggregation. See **Section 3.41.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The populations of qualifying species, and distribution of qualifying species within the site	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.41.1**			combination with other plans and projects
[1099] River lamprey (*Lampetra fluviatilis*) *Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*				
The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.41.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
				project in-combination with other plans and projects
The structure and function of the habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.41.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments Presence of structures and predator aggregation. See **Section 3.41.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
The populations of qualifying species, and distribution of qualifying species within the site	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.41.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1106] Atlantic salmon (*Salmo salar*) *Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*				
The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.41.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
				other plans and projects
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function of the habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.41.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments	None required	N / A	No impediment to the Conservation Objective being met, and no

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Presence of structures and predator aggregation. See **Section 3.41.2**			adverse effect on site integrity predicted from the project in-combination with other plans and projects
The populations of qualifying species, and distribution of qualifying species within the site	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.41.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.41.1 Sea lamprey [1095] and River lamprey [1099]

2353. Due to similarities in morphology and sensitivity to the relevant impacts, Sea lamprey and River lamprey are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

2354. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and distribution of qualifying species within the site.

2355. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to River lamprey.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and distribution of qualifying species within the site.

Increase in underwater noise and vibration

2356. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

2357. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2358. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

2359. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

2360. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

2361. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

2362. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2363. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2364. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

2365. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

2366. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2367. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2368. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic fields (Gill & Bartlett, 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

2369. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

2370. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2371. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2372. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

2373. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

2374. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted

to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2375. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

2376. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

2377. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

2378. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2379. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2380. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

2381. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2382. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

2383. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2384. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

2385. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2386. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2387. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

2388. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

2389. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project

from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2390. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2391. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

2392. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2393. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2394. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.41.2 Atlantic salmon [1106]

2395. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and distribution of qualifying species within the site.

Increase in underwater noise and vibration

2396. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

2397. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2398. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

2399. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

2400. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

2401. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

2402. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2403. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2404. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

2405. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

2406. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2407. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2408. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Armstrong *et al*. (2015) conducted a review of the potential effects of EMF on Atlantic salmon for Marine Scotland. It determined that salmonids did not exhibit behavioural responses when exposed to EMF levels (up to 95 µT; Armstrong *et al*., 2015). Furthermore, as a pelagic species that mainly travels in the top levels of the marine environment, interaction with cabling infrastructure is considered highly unlikely for salmon.

2409. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

2410. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2411. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2412. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

2413. The CWP Project alone assessment concluded that the effect on salmon from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

2414. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2415. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

2416. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

2417. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

2418. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to this QI, with effects

constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2419. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2420. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

2421. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2422. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

2423. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2424. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

2425. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2426. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2427. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

2428. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

2429. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2430. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2431. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such

scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

2432. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2433. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2434. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.42 River Derwent and Bassenthwaite Lake (UK0030032)

2435. This SAC is 222 km from the offshore development area and is screened in for Sea lamprey, River lamprey and Atlantic salmon.

2436. The following other plans and projects (**Table 3-96**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-96 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

2437. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-97 Conservation Objectives, Attributes and Targets for River Derwent and Bassenthwaite Lake SAC and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1095] Sea lamprey (*Petromyzon marinus*) *Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*				
The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.42.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
The structure and function of the habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.42.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments Presence of structures and predator aggregation. See **Section 3.42.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The populations of qualifying species, and distribution of qualifying species within the site	Presence of EMF Temporary increase in SSC and contaminated sediments	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.42.1**			site integrity predicted from the project in-combination with other plans and projects
[1099] River lamprey (*Lampetra fluviatilis*) *Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*				
The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.42.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
				site integrity predicted from the project in-combination with other plans and projects
The structure and function of the habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.42.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments Presence of structures and predator aggregation. See **Section 3.42.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
The populations of qualifying species, and distribution of qualifying species within the site	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.42.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1106] Atlantic salmon (*Salmo salar*) *Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*				
The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.42.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function of the habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.42.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments Presence of structures and predator aggregation.	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	See **Section 3.42.2**			predicted from the project in-combination with other plans and projects
The populations of qualifying species, and distribution of qualifying species within the site	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.42.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.42.1 Sea lamprey [1095] and River lamprey [1099]

2438. Due to similarities in morphology and sensitivity to the relevant impacts, Sea lamprey and River lamprey are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

2439. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and distribution of qualifying species within the site.

2440. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to River lamprey.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and distribution of qualifying species within the site.

Increase in underwater noise and vibration

2441. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

2442. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2443. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

2444. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

2445. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

2446. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

2447. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2448. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2449. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

2450. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

2451. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2452. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2453. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

2454. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

2455. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2456. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2457. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

2458. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

2459. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted

to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2460. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

2461. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

2462. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

2463. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2464. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2465. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

2466. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2467. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

2468. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2469. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

2470. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2471. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2472. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

2473. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

2474. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project

from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2475. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2476. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

2477. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2478. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2479. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.42.2 Atlantic salmon [1106]

2480. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and distribution of qualifying species within the site.

Increase in underwater noise and vibration

2481. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

2482. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2483. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

2484. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

2485. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

2486. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

2487. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2488. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2489. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

2490. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

2491. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2492. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2493. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Armstrong et al. (2015) conducted a review of the potential effects of EMF on Atlantic salmon for Marine Scotland. It determined that salmonids did not exhibit behavioural responses when exposed to EMF levels (up to 95 µT; Armstrong et al., 2015). Furthermore, as a pelagic species that mainly travels in the top levels of the marine environment, interaction with cabling infrastructure is considered highly unlikely for salmon.

2494. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

2495. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2496. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2497. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

2498. The CWP Project alone assessment concluded that the effect on salmon from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

2499. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2500. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

2501. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

2502. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

2503. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to this QI, with effects

constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2504. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2505. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

2506. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2507. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

2508. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2509. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

2510. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2511. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2512. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

2513. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

2514. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2515. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2516. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such

scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

2517. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2518. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2519. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.43 Solway Firth (UK0013025)

2520. This SAC is 231 km from the offshore development area and is screened in for Sea lamprey and River lamprey.

2521. The following other plans and projects (**Table 3-98**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-98 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

2522. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-99 Conservation Objectives, Attributes and Targets for Solway Firth SAC and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1095] Sea lamprey (*Petromyzon marinus*) *Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*				
The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.43.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
The structure and function of the habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.43.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments Presence of structures and predator aggregation. See **Section 3.43.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The populations of qualifying species, and distribution of qualifying species within the site	Increase in underwater noise and vibration Presence of EMF	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.43.1**			predicted from the project in-combination with other plans and projects

[1099] River lamprey (*Lampetra fluviatilis*)

Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.43.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
				adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function of the habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.43.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments Presence of structures and predator aggregation. See **Section 3.43.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
				other plans and projects
The populations of qualifying species, and distribution of qualifying species within the site	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.43.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.43.1 Sea lamprey [1095] and River lamprey [1099]

2523. Due to similarities in morphology and sensitivity to the relevant impacts, Sea lamprey and River lamprey are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

2524. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and distribution of qualifying species within the site.

2525. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to River lamprey.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and distribution of qualifying species within the site.

Increase in underwater noise and vibration

2526. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

2527. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2528. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

2529. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

2530. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

2531. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

2532. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2533. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2534. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

2535. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

2536. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2537. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2538. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

2539. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

2540. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2541. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2542. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

2543. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

2544. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted

to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2545. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

2546. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

2547. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

2548. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2549. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2550. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

2551. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2552. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

2553. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2554. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

2555. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2556. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2557. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

2558. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

2559. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project

from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2560. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2561. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

2562. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2563. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2564. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.44 River Eden (UK0012643)

2565. This SAC is 280 km from the offshore development area and is screened in for Sea lamprey, River lamprey and Atlantic salmon.

2566. The following other plans and projects (**Table 3-100**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-100 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

2567. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-101 Conservation Objectives, Attributes and Targets for River Eden SAC and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1095] Sea lamprey (*Petromyzon marinus*) *Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*				
The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.44.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
The structure and function of the habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.44.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments Presence of structures and predator aggregation. See **Section 3.44.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The populations of qualifying species, and distribution of qualifying species within the site	Increase in underwater noise and vibration Presence of EMF	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.44.1**			predicted from the project in-combination with other plans and projects

[1099] River lamprey (*Lampetra fluviatilis*)

Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.44.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
				adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function of the habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.44.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments Presence of structures and predator aggregation. See **Section 3.44.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
				other plans and projects
The populations of qualifying species, and distribution of qualifying species within the site	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.44.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1106] Atlantic salmon (*Salmo salar*) *Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*				
The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	See **Section 3.44.2**			combination with other plans and projects
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function of the habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.44.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments	None required	N / A	No impediment to the Conservation Objective being

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Presence of structures and predator aggregation. See **Section 3.44.2**			met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The populations of qualifying species, and distribution of qualifying species within the site	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.44.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.44.1 Sea lamprey [1095] and River lamprey [1099]

2568. Due to similarities in morphology and sensitivity to the relevant impacts, Sea lamprey and River lamprey are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

2569. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and distribution of qualifying species within the site.

2570. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to River lamprey.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and distribution of qualifying species within the site.

Increase in underwater noise and vibration

2571. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

2572. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2573. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

2574. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

2575. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

2576. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

2577. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2578. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2579. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

2580. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

2581. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2582. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2583. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

2584. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

2585. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2586. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2587. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

2588. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

2589. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted

to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2590. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

2591. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

2592. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

2593. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2594. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2595. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

2596. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2597. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

2598. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2599. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

2600. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2601. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2602. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

2603. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

2604. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project

from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2605. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2606. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

2607. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2608. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2609. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.44.2 Atlantic salmon [1106]

2610. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and distribution of qualifying species within the site.

Increase in underwater noise and vibration

2611. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

2612. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2613. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

2614. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

2615. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

2616. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

2617. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2618. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2619. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

2620. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

2621. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2622. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2623. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Armstrong *et al*. (2015) conducted a review of the potential effects of EMF on Atlantic salmon for Marine Scotland. It determined that salmonids did not exhibit behavioural responses when exposed to EMF levels (up to 95 µT; Armstrong et al., 2015). Furthermore, as a pelagic species that mainly travels in the top levels of the marine environment, interaction with cabling infrastructure is considered highly unlikely for salmon.

2624. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

2625. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2626. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2627. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

2628. The CWP Project alone assessment concluded that the effect on salmon from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

2629. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2630. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

2631. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

2632. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

2633. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to this QI, with effects

constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2634. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2635. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

2636. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2637. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

2638. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2639. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

2640. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2641. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2642. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

2643. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

2644. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2645. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2646. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such

scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

2647. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2648. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2649. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.45 River Axe (UK0030248)

2650. This SAC is 568 km from the offshore development area and is screened in for Sea lamprey.

2651. The following other plans and projects (**Table 3-102**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-102 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

2652. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-103 Conservation Objectives, Attributes and Targets for River Axe SAC and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1095] Sea lamprey (*Petromyzon marinus*) *Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*				
The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.45.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
The structure and function of the habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.45.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments Presence of structures and predator aggregation. See **Section 3.45.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The population of qualifying species and the distribution of qualifying species within the site	Increase in underwater noise and vibration Presence of EMF	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.45.1**			predicted from the project in-combination with other plans and projects

3.45.1 Sea lamprey [1095]

2653. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The population of qualifying species and the distribution of qualifying species within the site.

Increase in underwater noise and vibration

2654. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

2655. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2656. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

2657. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

2658. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

2659. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

2660. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects

constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2661. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2662. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

2663. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

2664. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2665. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2666. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

2667. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to

occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

2668. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2669. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2670. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

2671. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

2672. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2673. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

2674. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

2675. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

2676. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2677. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2678. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

2679. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2680. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

2681. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2

- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2682. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

2683. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2684. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2685. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

2686. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

2687. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2688. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array

- Oriel
- Mona
- Morgan
- Awel-y-Mor

2689. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

2690. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2691. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2692. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.46 River Avon (UK0013016)

2693. This SAC is 643 km from the offshore development area and is screened in for Sea lamprey and Atlantic salmon.

2694. The following other plans and projects (**Table 3-104**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SAC.

Table 3-104 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

2695. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect of such projects is considered to be nugatory, with no risk of adverse effect on site integrity.

Table 3-105 Conservation Objectives, Attributes and Targets for River Avon SAC and summary of associated assessment

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
[1095] Sea lamprey (*Petromyzon marinus*) *Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*				
The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.46.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
The structure and function of the habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.46.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments Presence of structures and predator aggregation. See **Section 3.46.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The populations of qualifying species, and the distribution of qualifying species within the site	Increase in underwater noise and vibration Presence of EMF	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.46.1**			predicted from the project in-combination with other plans and projects
[1106] Atlantic salmon (*Salmo salar*) *Conservation Objective: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*				
The extent and distribution of qualifying natural habitats and habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats See **Section 3.46.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function (including typical species) of qualifying natural habitats	CWP Project has no direct connectivity to the SAC and as such no potential to affect this attribute and target	None required	N / A	No impediment to the Conservation Objective being met, and no

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
				adverse effect on site integrity predicted from the project in-combination with other plans and projects
The structure and function of the habitats of qualifying species	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.46.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Temporary increase in SSC and contaminated sediments Presence of structures and predator aggregation. See **Section 3.46.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with

Attributes and targets	Predicted effect	Mitigation	Residual effect	Conclusion
				other plans and projects
The populations of qualifying species, and the distribution of qualifying species within the site	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.46.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.46.1 Sea lamprey [1095]

2696. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and the distribution of qualifying species within the site.

Increase in underwater noise and vibration

2697. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

2698. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2699. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

2700. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

2701. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

2702. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

2703. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects

constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2704. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

2705. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

2706. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2707. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2708. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze et al., 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

2709. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

2710. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2711. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2712. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

2713. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

2714. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2715. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

2716. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

2717. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

2718. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2719. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2720. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

2721. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2722. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

2723. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2

- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2724. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

2725. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2726. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2727. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

2728. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

2729. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2730. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array

- Oriel
- Mona
- Morgan
- Awel-y-Mor

2731. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

2732. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2733. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2734. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.46.2 Atlantic salmon [1106]

2735. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to this QI.

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; and
- The populations of qualifying species, and the distribution of qualifying species within the site.

Increase in underwater noise and vibration

2736. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

2737. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding

waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2738. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

2739. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

2740. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

2741. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

2742. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2743. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2744. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of EMF

2745. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

2746. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted

to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2747. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2748. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Armstrong et al. (2015) conducted a review of the potential effects of EMF on Atlantic salmon for Marine Scotland. It determined that salmonids did not exhibit behavioural responses when exposed to EMF levels (up to 95 µT; Armstrong et al., 2015). Furthermore, as a pelagic species that mainly travels in the top levels of the marine environment, interaction with cabling infrastructure is considered highly unlikely for salmon.

2749. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

2750. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2751. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2752. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Temporary increase in SSC and contaminated sediments

2753. The CWP Project alone assessment concluded that the effect on salmon from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP

Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

2754. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2755. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

2756. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

2757. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

2758. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to this QI, with effects constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2759. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2760. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Direct impacts on habitats

2761. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2762. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

2763. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2764. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

2765. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2766. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2767. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

Presence of structures and predator aggregation

2768. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

2769. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2770. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2771. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

2772. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects.

2773. For the CWP project in-combination with tier one and tier 2a projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity in combination with other plans or projects.

2774. For the CWP project in-combination with tier one, tier 2a, tier 2b and tier 3 projects, it can be concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity with other plans or projects.

3.47 French ZSCs – Migratory Fish

2775. This section includes the following SACs:

- Rade de Brest, Estuaire de l'Aulne (FR5300046) screened in for *Twaite shad, Allis shad and Sea lamprey*
- Côte de Granit Ros Sept-Îles (FR5300009) screened in for *Twaite shad, Allis shad and Sea lamprey*
- Rivière Léguer, forts de Beffou, Coat an Noz et Coat an Hay (FR5300008) screened in for *Twaite shad, Allis shad and Sea lamprey*
- Tregor Golo (FR5300010) screened in for *Twaite shad, Allis shad and Sea lamprey*
- Valle de l'Aulne (FR5300041) screened in for *Twaite shad, Allis shad and Sea lamprey*
- Rivière Scorff, Fort de Pont Calleck, Rivière Sarre (FR5300026) screened in for *Twaite shad, Allis shad and Sea lamprey*
- Baie de Saint-Brieuc – Est (FR5300066) screened in for *Twaite shad and Allis shad*
- Estuaire de la Rance (FR5300061) screened in for *Twaite shad, Allis shad and Sea lamprey*
- Golfe du Morbihan, côte ouest de Rhuys (FR5300029) screened in for *Twaite shad and Allis shad*
- Estuaire de la Vilaine (FR5300034) screened in for *Twaite shad, Allis shad and Sea lamprey*
- Baie de Seine occidentale (FR2502020) screened in for *Twaite shad, Allis shad and Sea lamprey*
- Estuaire de la Loire Nord (FR5202011) screened in for *Twaite shad, Allis shad and Sea lamprey*
- Baie du Mont Saint-Michel (FR2500077) screened in for *Twaite shad, Allis shad and Sea lamprey*
- Estuaire de la Loire Sud – Baie de Bourgneuf (FR5202012) screened in for *Twaite shad, Allis shad and Sea lamprey*
- Pertuis Charentais (FR5400469) screened in for *Twaite shad, Allis shad and Sea lamprey*
- Marais de Vilaine (FR5300002) screened in for *Twaite shad, Allis shad and Sea lamprey*
- Estuaires de la Loire (FR5200621) screened in for *Twaite shad, Allis shad and Sea lamprey*
- Baie de Seine orientale (FR2502021) screened in for *Twaite shad, Allis shad and Sea lamprey*
- Rivière Elorn (FR5300024) screened in for *Allis shad and Sea lamprey*
- Rivière Lata, Pointe du Talud, tangs du Loc'h et de Lannenec (FR5300059) screened in for *Allis shad and Sea lamprey*
- Rivière Elle (FR5300006) screened in for *Allis shad and Sea lamprey*
- Littoral Ouest du Cotentin de Brhal Pirou (FR2500080) screened in for *Allis shad and Sea lamprey*
- Marais du Cotentin et du Bessin – Baie des Veys (FR2500088) screened in for *Allis shad and Sea lamprey*
- Rivière le Douron (FR5300004) screened in for *Sea lamprey*
- Ria d'Etel (FR5300028) screened in for *Sea lamprey*
- Havre de Saint-Germain-sur-Ay et Landes de Lessay (FR2500081) screened in for *Sea lamprey*
- Bassin de l'Airou (FR2500113) screened in for *Sea lamprey*
- Vallée de la Sée (FR2500110) screened in for *Sea lamprey*
- Valle de l'Arz (FR5300058) screened in for *Sea lamprey*
- Lac de Grand-Lieu (FR5200625) screened in for *Sea lamprey*

2776. The following other plans and projects (**Table 3-106**) will be assessed for potential in-combination effects with the CWP Project in relation to migratory fish QIs of the above SACs.

Table 3-106 Other plans and projects considered in the in-combination assessment

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (CEA-2747)	2	11.9	1
Wicklow County Council – Wicklow Port Dredging (CEA-1355)	12.9	14.1	1
Sure Partners Limited, Site Investigations at Arklow Bank (CEA-2752)	9	17	1
Sure Partners Limited, Arklow Bank Wind Park Phase 2 Site Investigations (CEA-2753)	9	17	1
Sunrise Wind Ltd., Site Investigations for the proposed Sunrise Offshore Wind Farm, off Counties Dublin and Wicklow (CEA-2744)	0	2	1
Statkraft North Irish Sea Array (NISA) Site Investigations for Export Cable Route (CEA-2751)	45	27	1
Rockabill Cable Systems Ltd – Survey (CEA-2732)	42	17	1
Statkraft Ireland – North Irish Sea Array OWF (CEA-0094)	40	23	2a
North Irish Sea Array (NISA) Windfarm Limited – Site Investigations for export cable route (CEA-2751)	45	27	1
Dublin Port Company – MP2 Project (CEA-1323)	31.6	0	1
Dublin Port Company – MP2 Project (CEA-1328)	32.1	4	1
Dun Laoghaire Rathdown County Council – Mooring Maintenance (CEA-0198)	25.5	0.35	1
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-1359)	30	9.5	3
MaresConnect Limited – MaresConnect Electricity Interconnector – Site Investigation (CEA-2749)	30	9.5	1
Drogheda Port Company – Maintenance dredging River Boyne, Drogheda (CEA-2712)	67	36	1
Dublin Port Company – Maintenance Dredging in Dublin Port (CEA-0191)	36.1	0.35	1
Lir Offshore Array Ltd., – Site Investigations for the proposed Lir Offshore Array, off Counties Louth, Meath and Dublin (CEA-2745)	48	37	1
Hibernian Wind Power – Kilmichael Point (CEA_2756)	25	34.5	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Eirgrid Plc -– Rush (CEA-0196)	22.13	20	1
Dublin Port Company – Site Investigations (CEA-2727)	29	0.2	1
Dublin Port Company – dredge disposal (CEA-0206)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0207)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0208)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0209)	30	0.5	1
Dublin Port Company – dredge disposal (CEA-0210)	30	0.5	1
Dublin Port Capital Dredging Project (CEA-0192)	31.5	0,5	1
RWE Renewables – Dublin Array OWF (CEA-0037)	2.7	0	2a
SSE Renewables – Braymore Point (CEA-2742)	53	27	1
Banba Wind Ltd., – Site Investigations for proposed Offshore Wind Farm, off Counties Wicklow and Dublin (CEA-2746)	0	0	1
Sure Partners Limited – Arklow Bank Wind Park off coast of County Wicklow – survey (CEA-2752)	9	17	1
Sure Partners Limited – Arklow Bank OWF Phase 2 (CEA-0004)	9.7	9.9	2b
America Europe Connect Ltd (CEA-0195)	41	10	1
Dublin Port Company – 3FM Project (CEA-1348)	32.6	0	1
Drogheda Port Company – dumping at sea (CEA-1550)	64	42	3
Irish Mussel Seed Company Ltd (CEA-2204)	35	43	1
Oriel OWF Windfarm Ltd (CEA-2755)	84	62	2b
Mona OWF (CEA-0081)	125	132	1
Morgan OWF (CEA-0084)	140	147	1
Awel-y-Mor OWF (CEA-0007)	121	129	1
Wicklow County Council – Arklow Flood Relief Scheme (CEA-1380)	30.5	36	1
Irish Water – Arklow Wastewater Treatment Plant projects (CEA-1373)	31	36	1

Development	Distance from the array site (km)	Distance from the export cable corridor	Tier
Kish Offshore Wind Limited (CEA-2979)	23	1	3
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2989)	34	8	1
Microsoft Ireland Operations Ltd – Geophysical survey and site investigations (CEA-2991)	30	0	1
Iarnród Éireann – Geotechnical and geophysical site investigation survey (CEA-2993)	2	28	1
Dublin City Council – Environmental survey and ground investigation (CEA-2996)	1.5	34	1

2777. It is recognised that other plans or projects could act on migratory fish QIs in more distant areas, however these are so distant to the CWP Project that any effects are not considered to act in-combination at a level which could lead to any adverse impact on Conservation Objectives of any SAC. Any contribution made by CWP to an in-combination effect is considered to be nugatory, with no risk of AESI.

2778. These SACs are designated for Twaite shad [1103], Allis shad [1102] and Sea lamprey [1095]. Conservation objectives for these sites are presented in **Table 3-107** below. As site specific Conservation Objectives are not available for French sites, proxy objectives, attributes and targets are assumed for each of the above sites, based upon those presented for Pembrokeshire Marine SAC which shares common QIs with all the above listed ZSCs.

Table 3-107 Conservation Objectives, Attributes and Targets for Fish SACs (French)

Attributes and targets	Predicted effect	Mitigation	Residual effect (Project alone)	Conclusion
[1095] Sea lamprey (*Petromyzon marinus)* *Conservation Objective: To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.*				
Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site.	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.47.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future	Increase in underwater noise and vibration Presence of EMF	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (Project alone)	Conclusion
	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.47.1**			
Supporting habitats and species. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics of the species within the site and population beyond the site is stable or increasing	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.47.1**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Twaite shad [1103]				

Attributes and targets	Predicted effect	Mitigation	Residual effect (Project alone)	Conclusion
Conservation Objective: To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.				
Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.47.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

Attributes and targets	Predicted effect	Mitigation	Residual effect (Project alone)	Conclusion
	Presence of structures and predator aggregation. See **Section 3.47.2**			
Supporting habitats and species. The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics of the species within the site and population beyond the site is stable or increasing	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.47.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
[1102] Allis shad (Alosa alosa) *Conservation Objective: To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.*				
Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements	Increase in underwater noise and vibration Presence of EMF	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the

Attributes and targets	Predicted effect	Mitigation	Residual effect (Project alone)	Conclusion
are population size, structure, production and condition of the species within the site.	Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.47.2**			project in-combination with other plans and projects
Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future	Increase in underwater noise and vibration Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.47.2**	None required	N / A	No impediment to the Conservation Objective being met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects
Supporting habitats and species. The presence, abundance,	Increase in underwater noise and vibration	None required	N / A	No impediment to the Conservation Objective being

Attributes and targets	Predicted effect	Mitigation	Residual effect (Project alone)	Conclusion
condition and diversity of habitats and species required to support this species is such that the distribution, abundance and population dynamics of the species within the site and population beyond the site is stable or increasing	Presence of EMF Temporary increase in SSC and contaminated sediments Direct impacts on habitats Presence of structures and predator aggregation. See **Section 3.47.2**			met, and no adverse effect on site integrity predicted from the project in-combination with other plans and projects

3.47.1 Sea lamprey [1095]

2779. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Sea lamprey.

- Population structure of juveniles. At least three age / size groups present; and
- Juvenile density in fine sediment. Juvenile density at least 1 m².

Increase in underwater noise and vibration

2780. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

2781. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2782. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

2783. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

2784. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

2785. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

2786. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans

and projects. As such, it is concluded beyond reasonable scientific doubt that there is no in-combination adverse effect on site integrity for this SAC arising from the CWP Project either alone or in combination with other plans or projects.

Presence of EMF

2787. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

2788. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2789. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2790. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). Though lampreys are known to be able to detect weak electric fields (Bodznick & Preston, 1983), there is no evidence that lampreys possess an ability to detect magnetic fields (Gill & Bartlett 2010) and no evidence that EMF detection plays any role during migration, with lampreys known to use olfactory cues to navigate to suitable rivers (Vrieze *et al.,* 2011, Bjerselius et al., 2000, Polkinghorne et al., 2001).

2791. EMF arising from all plans or project are predicted to be well below the background levels the QIs experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

2792. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects. As such, it is concluded beyond reasonable scientific doubt that there is no

in-combination adverse effect on site integrity for this SAC arising from the CWP Project either alone or in combination with other plans or projects.

Temporary increase in SSC and contaminated sediments

2793. The CWP Project alone assessment concluded that the effect on lamprey from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QIs, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments, feed on organisms within the sediment, or live on or in the seabed sediments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

2794. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2795. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

2796. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

2797. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

2798. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects

almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects. As such, it is concluded beyond reasonable scientific doubt that there is no in-combination adverse effect on site integrity for this SAC arising from the CWP Project either alone or in combination with other plans or projects.

Direct impacts on habitats

2799. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2800. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

2801. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2802. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

2803. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects. As such, it is concluded beyond reasonable scientific doubt

that there is no in-combination adverse effect on site integrity for this SAC arising from the CWP Project either alone or in combination with other plans or projects.

Presence of structures and predator aggregation

2804. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

2805. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2806. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2807. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

2808. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects. As such, it is concluded beyond reasonable scientific doubt that there is no in-combination adverse effect on site integrity for this SAC arising from the CWP Project either alone or in combination with other plans or projects.

3.47.2 Twaite shad [1103] and Allis shad [1102]

2809. Due to similarities in morphology and sensitivity to the relevant impacts, Twaite shad and Allis shad are considered here together. Conclusions drawn are considered relevant to each individual QI's attributes and targets within this SAC.

2810. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Twaite shad.

- Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site; and
- Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.

2811. The following Conservation Objective attributes and targets are considered to have impact pathways arising from the CWP Project in relation to Allis shad.

- Population. The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production and condition of the species within the site; and
- Range. The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future.

Increase in underwater noise and vibration

2812. The site alone assessment for the CWP Project concluded that there would be a low likelihood of interaction with QIs of this SAC due to the very large distances between the CWP Project and the SAC. Furthermore, distances over which injurious effects may be seen were negligible, and rapid recovery or likely habituation was expected in the event TTS or behavioural effects. It was found that there was a lack of any potential barrier to migration from the CWP Project, and it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in underwater noise and vibration.

2813. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2814. All of the identified projects listed above for this site are considered to have the potential to result in increases to underwater noise.

2815. Based upon project alone assessments, the most likely effects to arise from offshore activities are short term behavioural responses to stimuli. Injurious effects, e.g. from underwater noise, are considered to only act within 100 m from piling activities, and within 810 m from UXO clearance work. It is considered that these distances are representative of other equivalent activities occurring at other projects. These areas of impact are considered to be negligible in the context of the wider availability of habitat for the QIs, and considering the low number of expected UXO clearance events, the small predicted areas for piling impacts, and the very limited likelihood of QI individuals being present in the affected areas, the potential for injurious effects is considered highly limited across all plans or projects.

2816. It should be considered that the behavioural effects arising from the CWP Project and others may act over larger distances particularly those arising from piling works, however it is considered highly unlikely that piling at all possible projects will occur simultaneously, not least due to availability of suitable piling vessels. Behavioural responses to an impact are considered to be immediately recoverable on cessation of the impact, and will not constitute a barrier to migration.

2817. Furthermore, the offshore development area does not constitute critical habitat for any migratory fish QI, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area.

2818. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural responses which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects. As such, it is concluded beyond reasonable scientific doubt that there is no in-combination adverse effect on site integrity for this SAC arising from the CWP Project either alone or in combination with other plans or projects.

Presence of EMF

2819. The CWP Project alone assessment concluded that considering the very low likelihood of interaction with this QI as a function of the distance to the SAC, the negligible areas over which EMF impacts present, and the lack of or minimal behavioural response predicted with no consequence on normal behaviours including migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effects on site integrity from EMF from the CWP Project alone.

2820. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2821. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination EMF as these are the only projects that include energy generation or transmission:

2822. Arklow Bank Phase 2

- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2823. EMF is considered to have the potential to 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). 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 fish at a site or population level, and little uncertainty remains (MMO, 2014). It is considered that shad may be able to detect low level induced

electric fields, however there is no evidence to suggest that EMF plays a role in migration for these species. Furthermore, as a pelagic species, interaction with cable infrastructure is considered highly unlikely for shad.

2824. EMF arising from all plans or project are predicted to be well below the background levels the QI experience and utilise for normal behaviours. As such, any responses in QIs are only anticipated to occur within the immediate vicinity of the cables at any project and no effect on migration or overall health and function is predicted.

2825. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects almost entirely constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects. As such, it is concluded beyond reasonable scientific doubt that there is no in-combination adverse effect on site integrity for this SAC arising from the CWP Project either alone or in combination with other plans or projects.

Temporary increase in SSC and contaminated sediments

2826. The CWP Project alone assessment concluded that the effect on shad from increased SSC may include an increase of energetic costs (decreased ability to find prey, increased metabolic cost for removing sediment from gills), temporary loss of available habitat, or behavioural responses leading to avoidance of the area thereby reducing the overall available habitat. No impact from contaminated sediments were predicted due to the low levels of contamination predicted in and around the CWP Project. Given the highly mobile nature of the QI, it is considered that most individuals will be able to avoid the affected area if required, and that there will be sufficient suitable alternative habitat available to ensure no effect on individuals normal behaviours and no barrier to migration. In addition, migratory species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, and their life history traits that expose them to high levels of SSC (e.g. they migrate through estuarine environments). As such, only behavioural avoidance, at most, is predicted. Therefore, given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, and the high degree of tolerance of these QIs to the impact with behavioural or avoidance effects predicted at most and no barrier to migration, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in SSC and contaminated sediments from the CWP project alone.

2827. It should be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of this QI will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2828. All of the identified projects listed above for this site are considered to have the potential to result in increases in SSC. Of these projects, seven are offshore wind farm developments, and three are dredging programmes. The impacts for these developments 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.

2829. For CWP, it was concluded that natural dispersal and sediment movement would ensure the plume returned to background levels within 15 days. This is likely to also be an indicative duration for other developments.

2830. Though it is highly unlikely that all projects will contribute to increased SSC simultaneously, the short duration of increased levels of SSC expected for all projects and rapid redistribution of sediments ensures effects will not adversely affect the Conservation Objectives or targets. Additionally, given the distances that the projects are from one another, the area over which the impacts may occur is very large and the extent of any impact limited. While the absolute area affected does increase, when considered proportionally to the areas of available around each project, the impact remains negligible in scale.

2831. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, with effects constrained to minor behavioural changes which are immediately recoverable, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects. As such, it is concluded beyond reasonable scientific doubt that there is no in-combination adverse effect on site integrity for this SAC arising from the CWP Project either alone or in combination with other plans or projects.

Direct impacts on habitats

2832. Habitat disturbance may be short or long term, however it should be noted here that there will be no impact on any of the SAC habitats, or on the estuary through which fish will migrate in order to reach the SAC by the CWP Project. All direct impacts considered here will only affect a relatively small area of ex situ offshore habitat that may be used during the marine phase of this species life cycle only. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to coastal migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2833. The CWP Project alone assessment concluded that the area of habitat affected by direct effects represents such a negligible proportion of the overall habitat available that there can be no adverse effect on any Conservation Objectives of the SAC from this impact. Furthermore, the offshore development area does not constitute critical habitat for migration, with the habitats present being ubiquitous and wide ranging throughout the Irish Sea, and there is therefore substantial alternative habitat that may be used as part of normal life history behaviours (e.g. feeding) in the immediate and wider area. As such, it was be concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity arising from direct impacts on habitats.

2834. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which may impact marine habitats utilised by this species (i.e. are not located within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan

- Awel-y-Mor

2835. The proportion of habitat affected by the CWP Project is expected to be representative of the other offshore wind developments Direct Impacts on habitats is a very discrete impact that occurs over a negligible spatial extent of the QIs marine phase when 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.

2836. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall marine habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects. As such, it is concluded beyond reasonable scientific doubt that there is no in-combination adverse effect on site integrity for this SAC arising from the CWP Project either alone or in combination with other plans or projects.

Presence of structures and predator aggregation

2837. The CWP Project Alone assessment concluded that given the large area over which these QIs are present, the considerable distance between the CWP Project and the SAC and therefore minimal potential interaction with the impact, the lack of importance of the area for migratory species, and the low likelihood of any increase in predation being encountered by individuals, it was concluded beyond reasonable scientific doubt that there will be no adverse effect on site integrity from increases in predation around structures from the CWP Project alone.

2838. It should be noted that this impact from predator aggregation around structures for the CWP project only exists in the marine environment and will not have any interaction with the riverine or estuarine environment through which this QI will pass during its migratory phase. As such, effects described here only affect the at sea portion of the QI life cycle, and will not concentrate predator density in riverine or estuarine environments. It should also be noted that due to the distance of the CWP Project from the SAC and its estuary, it is not expected that large numbers of these QIs will be present in the offshore development area or surrounding waters. As such, the potential for interaction with the impacts described herein is predicted to be low. Furthermore, considering the nature of the works, and the distance to the SAC, there is considered to be no barrier to migration or entry / exit of the estuary for this SAC by the CWP Project, and as such any minor contribution of the CWP Project to wider in-combination effects on this SAC is predicted to be nugatory.

2839. Of the projects listed above, only the following are predicted to have the potential to contribute to in-combination impacts, as these are the only projects which place additional infrastructure in the marine environment (i.e. not within estuarine or riverine environments):

- Arklow Bank Phase 2
- Dublin Array
- North Irish Sea Array
- Oriel
- Mona
- Morgan
- Awel-y-Mor

2840. As with the CWP Project, the presence of infrastructure at these other in-combination projects may lead to some attraction of fish species to the local area due to the increased biodiversity likely to be present on and around such structures in the marine environment, and the increased refugia they provide. It should however be considered that during key migratory periods, i.e. when individuals are travelling to feeding grounds or toward natal rivers, that individuals are highly driven to reach these

specific locations and are unlikely to spend large amounts of time focussed on alternative activities (i.e. foraging or looking for refugia). Increased predator pressure on migratory species in such scenarios, when there is likely to be greater numbers of alternative prey species present which therefore are more likely to be targeted, is considered to be negligible at most and no barrier to migration will arise.

2841. Accordingly, effects arising from the negligible contribution of the CWP Project to any in-combination impact will act over such a negligible proportion of the overall habitat available to these QIs, and with no potential to act as a barrier to migration, that there can be no adverse effect on any Conservation Objective of the SAC arising from impacts either from the CWP Project alone, or in combination with other plans and projects. As such, it is concluded beyond reasonable scientific doubt that there is no in-combination adverse effect on site integrity for this SAC arising from the CWP Project either alone or in combination with other plans or projects.

3.48 French ZSCs – Marine mammals

3.48.1 Harbour porpoise

Table 3-108 Conservation Objectives, Attributes and Targets for SACs (French)

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
Range: Species range within the site should not be restricted by artificial barriers to site use. Population: Human activities should occur at levels that do not adversely affect the harbour porpoise population at the site.	Increased underwater noise:			Adverse effects on the qualifying Annex II feature (harbour porpoise) of any French ZSC will not occur as a result of impacts associated with the CWP Project in-combination with other projects.
	The CWP Project has committed to implementing both a UXO MMMP and a piling MMMP. Other projects are anticipated to comply with 'industry standards' and follow the NPWS (2014) guidance. Increased underwater noise from CWP Project in-combination with other projects is not expected to: result in the permanent exclusion of harbour porpoise from part of its range within the site(s) and permanently prevent access for the species to suitable habitat; and adversely affect the harbour porpoise population at the site(s).	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site as a result of increased underwater noise from the CWP Project in-combination with other projects.	

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	Collision risk:			
	The CWP Project has committed to implementing an EVMP. Other projects are anticipated to comply with Marine Wildlife Watching Codes. Collision risk from the CWP Project in-combination with other projects is not expected to: result in the permanent exclusion of harbour porpoise from part of its range within the site(s) and permanently prevent access for the species to suitable habitat; and adversely affect the harbour porpoise population at the site(s).	No additional mitigation is required.	There is no potential for an impediment to the Conservation Objectives of the harbour porpoise feature of the site(s) as a result of collision risk from the CWP Project in-combination with other projects.	
	Changes in prey availability:			
	Changes in prey availability from the CWP Project in-combination with other projects will not cause barriers to site(s) use and are not expected to adversely affect the harbour porpoise population at the site(s).	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the site(s) from changes in prey availability from the CWP Project in-combination with other projects.	
	Changes in available habitat:			

Attributes and targets	Predicted effect	Mitigation	Residual effect (in-combination)	Conclusion
	Changes in available habitat from the CWP Project in-combination with other projects are not expected to: - result in the permanent exclusion of harbour porpoise from part of its range within the site(s) and permanently prevent access for the species to suitable habitat; and - adversely affect the harbour porpoise population at the site(s).	No additional mitigation is required.	There is no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the site(s) from changes in available habitat from the CWP Project in-combination with other projects.	

Increased underwater noise

2842. Target 2 of the Conservation Objectives states that *"proposed activities or operations should not introduce man-made energy (e.g. aerial or underwater noise, light or thermal energy) at levels that could result in a significant negative impact on individuals and / or the population of harbour porpoise within the site"*.

2843. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with any of the French ZSCs from increased underwater noise, either ex situ or in situ.

Assessment of the Project In-Combination

2844. This assessment focuses on the potential in-combination impact of construction activities at other offshore projects in the Celtic and Irish Sea MU for porpoise in 2027 (the same year as piling at the CWP project). As outlined in **EIAR Chapter 11, Appendix 11.1 Cumulative effects assessment for marine mammals**, there are expected to be seven other OWFs in the Celtic and Irish Sea MU that will be constructing in 2027 as well as two tidal projects, three coastal projects and one cable project (**Table 3-109**). As such, these offshore projects have been screened into the in-combination assessment for disturbance from underwater noise for harbour porpoise.

Table 3-109 Offshore projects constructing in the Celtic and Irish Sea MU in 2027.

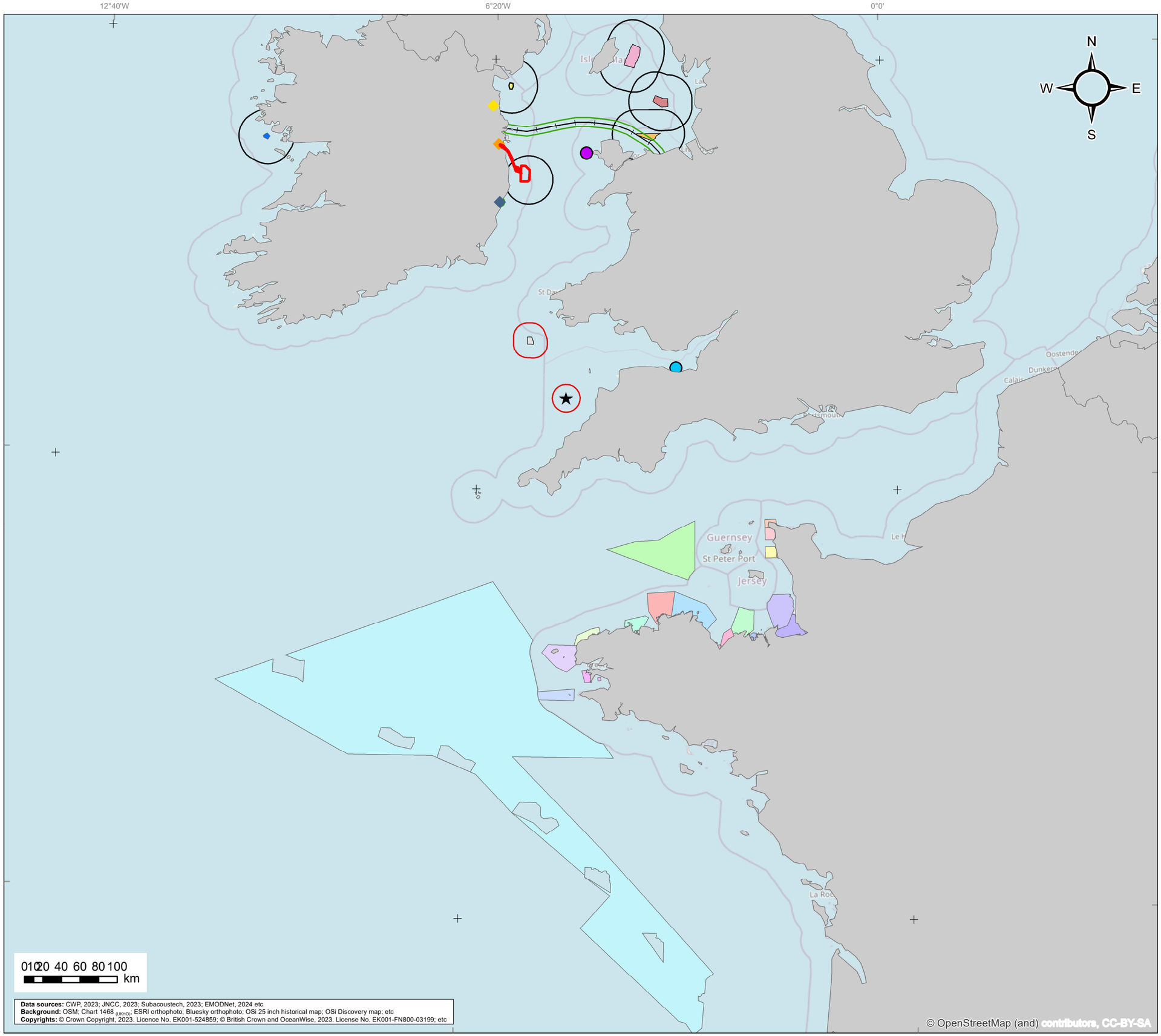
Project	Tier	Type
Codling	-	OWF
Awel y Môr	1	OWF
Erebus Floating Wind Demo	1	Floating
White Cross	1	Floating
West Somerset Tidal Lagoon	1	Tidal
Arklow Waste Water Treatment	1	Coastal
Maintenance dredging River Boyne, Drogheda	1	Coastal
North Wall Emergency Power Generation Plant	1	Coastal
Oriel	2b	OWF
Sceirde Rocks	2a	OWF
Morecambe	2b	OWF
Isle of Man	2b	OWF
Mares Connect	3	Cable
Holyhead Deep	3	Tidal

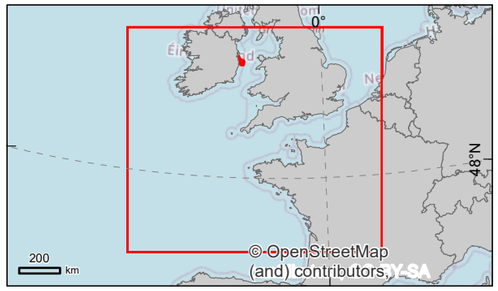
2845. To quantitatively assess the potential for disturbance to the SAC for each of the projects in-combination, a 26 km (fixed) or 15 km (floating (i.e., anchor pile installation) and / or jacket (pin) pile installation) EDR was assumed as an indicative disturbance area for each OWF project (this follows the guidance in JNCC (2020) for disturbance assessments to porpoise SACs in England, Wales and Northern Ireland where 26 km EDR is advised for monopiles and 15 km EDR is advised for pin-piles).

Additionally, it was assumed that coastal, tidal and cable projects require no piling activities and thus disturbance effects during construction are expected to be limited to activities such as dredging, trenching, cable laying, vessel activity etc for which a maximum 5 km EDR has been assumed (as per (McQueen et al., 2020) for dredging activities).

2846. With regards in situ effects none of the projects have disturbance impact ranges that overlap with any of the French ZSCs (**Figure 3-19**). With regards ex situex situ effects, the level of disturbance predicted to occur within the Celtic and Irish Sea MU between 2023 and 2028, and in particular in 2027, 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. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise feature of the ZSCs from an increase in underwater noise from construction activities from CWP Project in-combination with other projects, either ex situex situ or in situ.

2847. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community at any of the French ZSCs from disturbance from underwater noise from the CWP Project in-combination with other projects, and no potential for AESI overall.





Legend

- Planning application boundary
- 5 km EDR
- 15 km EDR
- 26 km EDR
- North Wall Power Plant
- Arklow Waste Treatment Plant
- Dogheda Maintenance Dredge
- West Somerset Lagoon Tidal
- Holyhead Deep Tidal
- Mares Connect
- Whitecross
- Sceirde Rocks
- Oriel
- Awel y Mor
- Isle of Man
- Morcambe
- Erebus (Floating)

French ZSCs

- Abers - Côte des légendes
- Anse de Vauville
- Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard
- Baie de Morlaix
- Baie de Saint-Brieuc - Est
- Baie du Mont Saint-Michel
- Banc et récifs de Surtainville
- Cap d'Erquy-Cap Fréhel
- Chausey
- Chaussée de Sein
- Cote de Granit Rose-Sept Iles
- Côte de Granit rose-Sept-Iles
- Côtes de Crozon
- Estuaire de la Rance
- Mers Celtiques - Talus du golfe de Gascogne
- Nord Bretagne DH
- Ouessant-Molène
- Récifs et landes de la Hague
- Tregor Goëlo

codling wind park

Project: Codling Wind Park

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Figure 3.19:
26 km EDR for piling in combination with the 5 km, 15 km and 26 km EDR from other construction projects, in relation to the French Zoumises à des Contraintes Naturelles (ZSCs) designated for harbour porpoise

CWP doc. number: CWP-SMR-ENG-08-01-MAP-1677

Internal descriptive code: IRE.ECH - PAB..DPNM.THRESH.SEDR.15EDR.26EDR.CONT. - ARK.WASTE.TP, AWEL..DOGHEDA.MAIN.DREDGE..EREBUS..HOLYDEEP.TIDAL..ISLE.OF.MAN., MARES.CONNECT..MORCAMBE..NORTH.WALL.PP..ORIEL..SCEIRDE.ROCKS., WEST.SOMER.LAG.TIDAL..WHITECROSS..FRENCH.ZSCs - (NIS Vol.06.a.Sec.03.FIG.10)

Size: A3
Scale: 1:4,000,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
A	Final version	2024/07/17	JC	RRS/EA	JM

Vessel collision

2848. Target 2 of the Conservation Objectives states that *"proposed activities or operations should not cause death or injury to individuals to an extent that may ultimately affect the harbour porpoise population at the site"*.

2849. The Project alone assessment concluded that there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community at any of the French ZSCs from collision risk, either ex situex situ or in situ.

Assessment of the Project In-Combination

2850. The risk of collision to marine mammals is expected to be primarily localised to within the boundaries of the respective projects. None of the project boundaries overlap with any of the French ZSCs. The vessel routes and potential ports used by other offshore projects are unknown, and therefore it is not possible to estimate the expected level of vessel activity within any of the French ZSCs from other projects. However, it is assumed that all other offshore projects in the Celtic and Irish Sea MU will either adopt a VMP or follow best practice codes of conduct on vessel handing around marine mammals[35] to minimise any potential effects on marine mammals and reduce risk of collision. As such, the potential for collision risk from CWP Project in-combination with other projects is considered negligible.

2851. No harbour porpoise within any of the French ZSCs are expected to experience death or injury from vessel collisions and as such, risk of collision will not adversely affect the harbour porpoise community at any of the French ZSCs. Therefore, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community at any of the French ZSCs from collision risk from the CWP Project in-combination with other projects, and no potential for AESI overall.

Changes in prey availability

2852. Target 2 of the Conservation Objectives states that "*Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site. This target also relates to proposed activities or operations that may result in the deterioration of key resources (e.g. water quality, feeding, etc.) upon which harbour porpoise depend*".

2853. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with any of the French ZSCs from changes in prey availability, either ex situex situ or in situ.

Assessment of the Project In-Combination

2854. Where multiple projects may impact upon harbour porpoise fish prey species or the habitats that support the prey within the site, there is the potential for in-combination indirect effects on the harbour porpoise community. Therefore, projects with the potential to act in-combination with CWP are those where the spatial footprint of activities (e.g., underwater noise, seabed disturbance) may encroach upon any of the French ZSCs.

[35] E.g. IWDG code of conduct (https://iwdg.ie/cms_files/wp-content/uploads/2022/06/Code-of-Conduct-When-Encountering-Whales-And-Dolphins-A3-Document.pdf), Sea Wise Code advised by NRW (https://naturalresources.wales/media/3513/sea-wise-code.pdf), South and West Wales seabird and seal code of conduct (https://www.welshwildlife.org/nature-reserves/code-conduct-seabirds-and-seals).

2855. To inform this NIS, **Chapter 9 Fish, Shellfish and Turtle Ecology** of the EIAR prepared for the Project was referred to. The EIAR concludes that there will be no significant impact to any fish species from any impact pathway during the construction, operation or decommissioning of the CWP Project alone (this includes direct damage, disturbance, increased suspended sediment concentration (SSC) and sediment deposition, release of seabed contaminants, underwater noise etc).

2856. Considering the conclusions for the Project Alone assessment, the potential for CWP to provide a non-negligible contribution to in-combination effects on prey availability alongside other projects is considered to be remote. To inform this NIS assessment, the assessment of potential cumulative effects on fish and shellfish receptors carried out as a part of the EIAR (**Chapter 9 Fish, Shellfish and Turtle Ecology**) was referred to. While the EIAR cumulative assessment does not specifically assess impacts to harbour porpoise prey species within any of the French ZSCs, it does assess the broader potential for cumulative effects to these wide-ranging fish species to result from CWP in combination with relevant projects, including OWF projects on the east coast of Ireland, including Arklow Bank, Dublin Array and NISA. The EIAR concluded that impacts such as temporary habitat loss or disturbance, long-term habitat loss and increased suspended sediments concentrations are expected to occur over a spatial extent which is very small relative to the wider area over which developments occur, and relative to the size of available spawning and nursery areas for fish. Therefore, these impacts are considered negligible in the context of the wider availability of suitable habitat for marine mammal prey species. In summary, the cumulative assessment for fish and shellfish does not identify any significant cumulative effects resulting from the CWP Project alongside other projects. As such, it is anticipated that during the construction phase and any maintenance / decommissioning activities at CWP and other projects, any impacts to harbour porpoise prey availability will be negligible.

2857. Considering the above, there is expected to be no long-term change to harbour porpoise prey species presence, abundance, condition or diversity; as such, there will be no deterioration of key resources (feeding) upon which harbour porpoises depend. There is, therefore, no potential for impediment to the Conservation Objectives of the harbour porpoise community at any of the French ZSCs from changes in prey availability from the CWP Project in-combination with other projects, and no potential for AESI overall.

Changes in available habitat

2858. Target 1 of the Conservation Objectives states that *"Species range within the site should not be restricted by artificial barriers to site use. This target may be considered relevant to proposed activities or operations that will result in the permanent exclusion of harbour porpoise from part of its range within the site or will permanently prevent access for the species to suitable habitat therein"*.

2859. The Project Alone assessment concluded that there is no potential for an impediment to the Conservation Objectives of the harbour porpoise community associated with any of the French ZSCs from changes in available habitat, either ex situex situ or in situ.

Assessment of the Project In-Combination

2860. While offshore projects within the Celtic and Irish Sea MU have the potential to cause disturbance impacts to harbour porpoise, like CWP Project alone, the behavioural effects will be short-lived, and animals are expected to return to baseline activities following the cessation of activities. As such, no activities at any project are expected to result in the permanent exclusion of harbour porpoise from part of their range within any of the French ZSCs.

2861. Considering the above, there is expected to be no potential for impediment to the Conservation Objectives of the harbour porpoise community at any of the French ZSCs from changes in available habitat from the CWP Project in-combination with other projects, and no potential for AESI overall.

4 NIS (IN-COMBINATION) CONCLUSION

2862. The purpose of this document, which will accompany the application for development of the CWP Project, was to inform the AA process in determining whether the CWP Project would adversely affect the integrity of any European sites.

2863. The Stage 2, NIS concluded that following application of suitable mitigation where required, the CWP Project either alone or in-combination with other plans or projects, would not have an (either ex situ or in situin situ) adverse effect on the integrity of any European site.

5 REFERENCES

2864. Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities. Environment, Heritage and Local Government (2009 – Revised February 2010).

2865. Armstrong,J.D., Hunter, D-C., Fryer, R.J., Rycroft, P., & Orpwood, J.E., 2015. Behavioural Responses of Atlantic Salmon to Mains Frequency Magnetic Fields. Scottish Marine and Freshwater Science Vol 6 No 9

2866. Ashley, M., 2016. Polychaetes in littoral fine sand. In Tyler-Walters H. and Hiscock K. *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*, [online, accessed:30-10-2023]. Plymouth: Marine Biological Association of the United Kingdom. Available from: https://www.marlin.ac.uk/habitat/detail/1125

2867. Assessment of plans and projects significantly affecting Natura 2000 sites. Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC.

2868. Bjerselius, R., Li, W., Teeter, J.H., Seelye, J.G, Johnsen, P.J, Maniak, P.J., Grant, G.C., Polkinghorne, C.N. & Sorensen, P.W. 2000. Direct behavioral evidence that unique bile acids released by larval sea lamprey (Petromyzon marinus) function as a migratory pheromone. Canadian Journal of Fisheries and Aquatic Sciences, 57(3), 557-569.

2869. Bodznick, D. & Preston, D.G. 1983. Physiological characterization of electroreceptors in the lampreys *Ichthyomyzon unicuspis* and *Petromyzon marinus*. Journal of Comparative Physiology, 152 (2) 209–217.

2870. CIEEM (2018). The Guidelines for Ecological Impact Assessment in the UK and Ireland

2871. Circular NPW 1/10 & PSSP 2/10 (March 2010)

2872. Coughlan M., Guerrini, M., Creane, S., O'Shea M., Ward, S. L., Van Landeghem, K. J.J., Murphy & Doherty, P. (2021). A new seabed mobility index for the Irish Sea: Modelling seabed shear stress and classifying sediment mobilisation to help predict erosion, deposition, and sediment distribution. Continental Shelf Research Volume 229.

2873. Data/gov.ie .2007. Contaminants in sediments in the marine environment – Datasets – data.gov.ie

2874. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

2875. European Commission. (Nov. 2001 – published 2002).

2876. EU Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC (2007).

2877. Gill, A.B. & M. Desender. 2020. Risk to Animals from Electro-magnetic Fields Emitted by Electric Cables and Marine Renewable Energy Devices

2878. Gill, A.B. & Bartlett, M. 2010. Literature review on the potential effects of electromagnetic fields and subsea noise from marine renewable energy developments on Atlantic salmon, sea trout and European eel. Scottish Natural Heritage Commissioned Report No.401.

2879. Gill, A. B., Huang, Y., Gloyne-Philips, I., Metcalfe, J., Quayle, V., Spencer, J. & Wearmouth, V. 2009. COWRIE 2.0 Electromagnetic Fields (EMF) Phase 2: EMF-sensitive fish response to EM emissions from sub-sea electricity cables of the type used by the offshore renewable energy industry. Report to Collaborative Offshore Wind Research into the Environment (COWRIE) COWRIE.

2880. Gilles, A., Authier, M., Ramirez-Martinez, N., Araújo, H., Blanchard, A., Carlström, J., Eira, C., Dorémus, G., FernándezMaldonado, C., Geelhoed, S., Kyhn, L., Laran, S., Nachtsheim, D., Panigada, S., Pigeault, R., Sequeira, M., Sveegaard, S., Taylor, N., Owen, K., Saavedra, C., Vázquez-Bonales, J., Unger, B. & Hammond, P. (2023) Estimates of cetacean abundance in European Atlantic waters in

summer 2022 from the SCANS-IV aerial and shipboard surveys. Available at: https://tinyurl.com/3ynt6swa.

2881. JNCC, D. 2019a. Harbour Porpoise (*Phocoena phocoena*) Special Area of Conservation: North Channel. Conservation Objectives and Advice on Operations.

2882. JNCC, N., DAERA,. 2019b. Harbour Porpoise (*Phocoena phocoena*) Special Area of Conservation: North Anglesey Marine/ Gogledd Môn Forol. Conservation Objectives and Advice on Operations.

2883. JNCC, N. E., NRW. 2019c. Harbour Porpoise (*Phocoena phocoena*) Special Area of Conservation: Bristol Channel Approaches / Dynesfeydd Môr Hafren. Conservation Objectives and Advice on Operations.

2884. Kingston, P.F. 2001. Benthic Organisms Review. In Encyclopedia of Ocean Sciences, 2nd Edition. Compiled by Steele, JS and edited by Steele, JS; Thorpe, SA & Turekian, KK.

2885. Love, M. S., Nishimoto, M. M., Snook, L., Schroeder, D. M. & Scarborough Bull, A. 2017b. A Comparison of Fishes and Invertebrates Living in the Vicinity of Energized and Unenergized Submarine Power Cables and Natural Sea Floor off Southern California, USA. Journal of Renewable Energy, 13. doi:10.1155/2017/872716

2886. McCorry, M; Ryle, T. Saltmarsh monitoring project 2007-2008; unpublished report to NPWS

2887. NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill

2888. NPWS. (2012). Lower River Shannon SAC (site code: 2165) Conservation objectives supporting document- marine habitats and species.

2889. NPWS. (2014). Guidance document for minimising the acoustic impact of man-made sound sources on marine mammals.

2890. NPWS. (2015). West Connacht Coast SAC (site code: 2998) Conservation objectives supporting document- marine species. Version 1, October 2015.

2891. NRW, J. (2019). Harbour Porpoise (*Phocoena phocoena*) Special Area of Conservation: West Wales Marine / Gorllewin Cymru Forol. Conservation Objectives and Advice on Operations.

2892. NE (2018b) European Site Conservation Objectives for River Wye / Afon Gwy Special Area of Conservation Site Code: UK0012642. Version 4.

2893. Newcombe, C.P. and J.O.T. Jensen. 1996. Channel suspended sediment and fisheries: A synthesis for quantitative assessment of risk and impact. North American Journal of Fisheries Management 16: 693-727.

2894. Managing Natura 2000 Sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (2000).

2895. MMO (2014). Review of post-consent offshore wind farm monitoring data associated with licence conditions. A report produced for the Marine Management Organisation, pp 194. MMO Project No: 1031. ISBN: 978-1-909452-24-4.

2896. McQueen, A.D., Suedel, B.C., De Jong, C. & Thomsen, F. (2020) Ecological risk assessment of underwater sounds from dredging operations. Integrated environmental assessment and management, 16, 481–493.

2897. Pirotta, E., Laesser, B.E., Hardaker, A., Riddoch, N., Marcoux, M. & Lusseau, D. (2013) Dredging displaces bottlenose dolphins from an urbanised foraging patch. Marine Pollution Bulletin, 74, 396–402.

2898. Polkinghorne, C.N., Olson, J.M., Gallaher, D.G. & Sorensen, P.W. 2001. Larval sea lamprey release two unique bile acids to the water at a rate sufficient to produce detectable riverine pheromone plumes. Fish Physiology and Biochemistry, 24(1) 15-30

2899. Stamp, T.E., Tyler-Walters, H., & Burdett, E.G. 2023. *Laminaria hyperborea* and foliose red seaweeds on moderately exposed infralittoral rock. In Tyler-Walters H. *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*, [on-line]. Plymouth: Marine Biological Association of the United Kingdom. [online, accessed: 07-12-2023]. Available from: https://www.marlin.ac.uk/habitat/detail/292

2900. Tillin, H.M., Rayment, W.J., Williams, E., Tyler-Walters, H., Lloyd, K.A., & Watson, A. 2023. *Hediste diversicolor* and *Macoma balthica* in littoral sandy mud. In Tyler-Walters H. and Hiscock K. (eds) *Marine Life Information Network: Biology and Sensitivity Key Information Reviews*, [on-line]. Plymouth: Marine Biological Association of the United Kingdom. [cited 24-02-2024]. Available from: https://www.marlin.ac.uk/habitat/detail/209

2901. UK Department for Business Innovation & Skills (BIS) (2008). *Review of Cabling Techniques and Environmental Effects Applicable to the Offshore Wind Farm Industry*. Report by Centre for Environment Fisheries and Aquaculture Science (CEFAS). Report for UK Department for Business Innovation & Skills (BIS).

2902. Vrieze,L.A., Bergstedt, R.A. & Sorensen, P.W. 2011. Olfactory-mediated stream-finding behavior of migratory adult sea lamprey (*Petromyzon marinus*). Canadian Journal of Fisheries and Aquatic Sciences, 68 (3), 523-533.