

Sure Partners Limited ARKLOW BANK WIND PARK PHASE 2 OFFSHORE INFRASTRUCTURE

Environmental Impact Assessment Scoping Report

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Contents

	Gloss Acror	sary nyms	vii ix
	Units	XII	
1.	INTR	ODUCTION	1
	1.1	Overview	1
	1.2	Purpose of Scoping Report	1
	1.3	Project background	2
2.	POLI	CY AND LEGISLATIVE CONTEXT	3
	2.1	Renewable energy targets	3
	2.2	Draft National Marine Planning Framework	3
	2.3	National Planning Framework	4
	2.4	Regional and local policy objectives	4
	2.5	Foreshore Lease	4
	2.6	Environmental Impact Assessment	4
	2.7	Appropriate Assessment	5
3.	CON	SULTATION PROCESS	6
	3.1	Consultation – EIA Scoping	6
	3.2	Public consultation	6
4.	DES	CRIPTION OF DEVELOPMENT	8
	4.1	Location	8
	4.2	Offshore infrastructure	8
	4.3	Construction	11
	4.4	Operation and maintenance	12
	4.5	Decommissioning	12
	4.6	Assessment of alternatives	13
5.	EIA S	SCOPING	14
	5.1	Background	14
	5.2	EIA Scoping guidance	16
	5.3	Technical scope	16
	5.4	Consultation process feedback	17
6.		METHODOLOGY	18
	6.1	Introduction	18
	6.2	Legislation and guidance	18
	6.3	Project Design Envelope approach	19
	6.4	Iterative approach	20
	6.5	Identification of impacts and assessment of significant effects	20
	6.6	Competent experts	22
	6.7	Cumulative Impact Assessment	22
	6.8	Transboundary assessment	24
	6.9	Interactions	24
	6.10	Interface with onshore infrastructure	25
7.	SCO	PING OF EIAR	26
	7.1	Introduction	26
	7.2	Coastal processes	27
	7.3	Noise (airborne and underwater)	
	7.4	Benthic subtidal and intertidal ecology	41
	7.5	Fish, shellfish and sea turtle ecology	52

	7.6	Marine mammals	63
	7.7	Offshore ornithology	73
	7.8	Offshore bats	
	7.9	Commercial fisheries and aquaculture	
	7.10	Shipping and navigation	
	7.11	Civil and military aviation	
	7.12	Seascape landscape and visual amenity	
	7.13	Marine Archaeology	
	7.14	Infrastructure and other users (material assets)	
	7.15	Air quality and climate	
	7.16	Population and Human Health	
	7.17	Major accidents and natural disasters	134
8.	SUM	MARY OF EIA SCOPING	
	8.1	Summary	
	8.2	EIAR structure and content	
	8.3	Next steps	
9.	REF	ERENCES	

Figures

Figure 4.1: Location of the Proposed Development	9
Figure 5.1: The position of scoping an EIAR within the EIA process (source: Draft Guidelines on the	
Information to be Contained in an EIAR (EPA, 2017)	15
Figure 7.1: Coastal Processes Study Area.	28
Figure 7.2: Borehole locations and Arklow Bank bathymetry	30
Figure 7.3: Average suspended particulate matter 1998 to 2015.	33
Figure 7.4: Admiralty Chart 1787 data and Arklow Bank Survey 2016 bathymetry.	34
Figure 7.5: Sand waves on Arklow Bank	35
Figure 7.6: Geophysical seabed interpretation, including seabed features.	46
Figure 7.7: European sites in proximity to the Proposed Development.	48
Figure 7.8: Fish, Shellfish and Sea Turtle Ecology Study Area and Western Irish Sea Fish, Shellfish	
and Sea Turtle Study Area and sites designated for the protection of Annex II fish	
species	53
Figure 7.9: Spawning and nursery grounds for cod and haddock (Ellis et al., 2012)	57
Figure 7.10: Spawning and nursery grounds for whiting and herring (Ellis et al., 2012)	58
Figure 7.11: Spawning and nursery grounds for mackerel and nephrops (Ellis et al., 2012)	59
Figure 7.12: Marine Mammal Study Area, Irish Sea Marine Mammal Study Area, and sites designated	
for the protection of Annex II marine mammals.	64
Figure 7.13: Study areas for marine mammal boat-based surveys 2000-2009	67
Figure 7.14: Aerial survey area with transects at 2 km spacing, Lease Area and 4 km buffer (March	
2018 to February 2020 and April 2020)	68
Figure 7.15: Aerial survey design showing Arklow Bank with transects at 2 km spacing, Lease Area	
and 4 km buffer	76
Figure 7.16: Commercial Fisheries and Aquaculture Study Area.	86
Figure 7.17: Annual landings weights (tonnes) from rectangle 34E3 (average 2013 to 2017)	88
Figure 7.18: Annual landings weights (tonnes) from rectangle 34E4 (average 2013 to 2017)	89
Figure 7.19: Aquaculture in the vicinity of the Proposed Development	91
Figure 7.20: Navigational features in proximity to the Lease Area	97

Figure 7.21: AIS data within the Shipping and Navigation Study Area colour-coded by vessel type (70 Days AIS, 2018/19).	.98
Figure 7.22: Vessel type distribution within the Shipping and Navigation Study Area (70 Days AIS, 2018/19).	99
Figure 7.23: Density map of AIS data within the Shipping and Navigation Study Area (70 Days AIS, 2018/19).	100
Figure 7.24: Civil and Military Aviation Study Area showing UK Visual Flight Rules (VFR) Aviation Chart 1:500,000 depicting Irish airspace structure.	106
Figure 7.25: Initial Seascape, Landscape and Visual Amenity Study Area Figure 7.26: Distribution of known historic wreck sites and potential wreck sites on Arklow Bank and in	111
the adjacent sea area	118
Figure 7.27: Distribution of wreck sites and potential wreck sites, 2020	119
Figure 7.28: Infrastructure and Other Users Study Area	123
Figure B.1: Location of the Proposed Development and relevant jurisdictional boundaries	152

Tables

Table 6.1: Matrix used for the assessment of the significance of the effect	21
Table 7.1: Impacts to be scoped in for the Coastal Processes EIAR chapter	
Table 7.2: Impacts to be scoped out of the Coastal Processes EIAR chapter	37
Table 7.3: Impacts to be scoped in for the Airborne Noise EIAR chapter	
Table 7.4: Summary of site-specific benthic subtidal ecology surveys of the Arklow Bank Wind Park	42
Table 7.5: Impacts to be scoped in for the Benthic Subtidal and Intertidal Ecology EIAR chapter	49
Table 7.6: Impacts to be scoped out of the Benthic Subtidal and Intertidal Ecology EIAR chapter	50
Table 7.7: Examples of key desktop sources to inform the fish, shellfish and sea turtle ecology	
baseline	54
Table 7.8: Impacts to be scoped in for the Fish, Shellfish and Sea Turtle Ecology EIAR chapter	60
Table 7.9: Impacts to be scoped out of the Fish, Shellfish and Sea Turtle Ecology EIAR chapter	62
Table 7.10: Key sources of information for the marine mammal baseline.	65
Table 7.11: Impacts to be scoped in for the Marine Mammals EIAR chapter	70
Table 7.12: Impacts to be scoped out of the Marine Mammals EIAR chapter	71
Table 7.13: Species recorded during site-specific surveys and definitions of biological seasons (from	
Furness, 2015 and Snow and Perrins 1998 ^a)	78
Table 7.14: Impacts to be scoped in for the Offshore Ornithology EIAR chapter.	81
Table 7.15: Impacts to be scoped out of the Offshore Ornithology EIAR chapter.	82
Table 7.16: Annual average landings from the Commercial Fisheries and Aquaculture Study Area	
(ICES rectangles 34E3 and 34E4) by port	90
Table 7.17: Impacts to be scoped in for the Commercial Fisheries and Aquaculture EIAR chapter	92
Table 7.18: Impacts to be scoped in for the Shipping and Navigation EIAR chapter.	102
Table 7.19: Impacts to be scoped in for civil and military aviation.	108
Table 7.20: Impacts to be scoped out of the Civil and Military Aviation EIAR chapter.	108
Table 7.21: Impacts to be scoped in for the Seascape, Landscape and Visual Amenity EIAR chapter	114
Table 7.22: Impacts to be scoped in for the Marine Archaeology EIAR chapter	120
Table 7.23: Summary of infrastructure and other users data sources.	124
Table 7.24: Impacts to be scoped in for the Infrastructure and Other Users EIAR chapter	126
Table 7.25: Impacts to be scoped out of the Infrastructure and Other Users EIAR chapter	127
Table 7.26: Impacts to be scoped in for the Climate EIAR chapter.	130
Table 7.27: Impacts to be scoped out of the Climate EIAR chapter.	130
Table 7.28: Summary of key desktop reports	131
Table 7.29: Impacts to be scoped in for the Population and Human Health EIAR chapter.	132
Table 7.30: Impacts to be scoped out of the Population and Human Health EIAR chapter.	133
Table 8.1: Summary of EIAR Scoping topics to be assessed and in relation to phase	135

135
154
155
159

Appendices

Appendix A List of Scoping Consultees	146
Appendix B Potential Transboundary Impacts	150

Glossary

Term	Meaning
Arklow Bank Wind Park	Arklow Bank Wind Park Phase 1 and Phase 2 together. Arklow Bank Wind Park is an offshore wind farm project situated on and around Arklow Bank in the Irish Sea, approximately 6 to 13 km to the east of Arklow in County Wicklow.
Arklow Bank Wind Park Phase 1	The 7 turbines and associated grid cable back to Arklow ESB switch station, owned and operated by GE Wind Energy under a sublease to the main foreshore lease.
Arklow Bank Wind Park Phase 2	 "The Project", the combination of the individual components listed below. Arklow Bank Wind Park Phase 2 Offshore Infrastructure: This includes all elements of the project consented under the existing Foreshore Lease. Arklow Bank Wind Park Phase 2 Onshore Grid Infrastructure: This relates to the onshore grid infrastructure. Arklow Bank Wind Park Phase 2 Operations and Maintenance Facility Onshore Infrastructure: This includes the onshore infrastructure at the OMF, with consent application to be submitted to Wicklow County Council Arklow Bank Wind Park Phase 2 Operations and Maintenance Facility Nearshore Infrastructure: This includes any required berthing pontoons/nearshore infrastructure, with Foreshore Lease application to be submitted to Department of Housing Planning and Local Government Arklow Bank Wind Park Phase 2 Eirgrid Upgrade Works: any non-contestable grid upgrade works, consent to be sought and works to be completed by Eirgrid.
Arklow Bank Wind Park Phase 2 – Offshore Infrastructure	The subject of this EIAR Scoping Report.
Bathymetry	The measurement of water depth in oceans, seas and lakes.
Benthic ecology	Benthic ecology encompasses the study of the organisms living in and on the sea floor, the interactions between them and impacts on the surrounding environment.
Biotope	The combination of physical environment (habitat) and its distinctive assemblage of conspicuous species.
Circalittoral	The subzone of the rocky sublittoral below that dominated by algae (i.e. the infralittoral) and dominated by animals.
Cumulative Impacts	'The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects' (EPA, 2017).
Designated Landscape	Areas of landscape identified as being of importance at international, national or local levels, either defined by statute of identified in local development plans.
The Developer	Sure Partners Ltd.
"Do Nothing" Scenario	The environment as it would be in the future should the proposed project not be developed.
"Do Something" Scenario	The environment should the proposed project be developed.
EirGrid	State-owned electric power transmission operator in Ireland.
Environmental Impact Statement	This report was submitted to support the Foreshore Lease application by the developer in 2001.
Environmental Impact Assessment	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Directive and EIA Regulations, including the publication of an Environmental Impact Assessment (EIA) Report.
Foreshore	The area of the land and seabed between the high water mark of ordinary or medium tides and the 12 nautical mile limit.
Foreshore Lease Area	The Arklow Bank Wind Park area in which the wind turbines, foundations, inter- array cables, export cables and offshore substations will be located.
Indirect Impact	'Impacts on the environment, which are not a direct result of the project, often produced away from (the site) or as a result of a complex pathway' (EPA, 2017).

Term	Meaning		
Infauna	The animals living in the sediments of the seabed.		
Landscape Character Area	Distinct types of landscape which are generic in character in that they may occur in different parts of the country, but wherever they are they share broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement pattern.		
Landfall	The area in which the offshore export cables make landfall and is the transitional area between the offshore cabling and the onshore cabling.		
Land Use	The use and management of the natural, semi-natural and built environment.		
Magnitude	Size, extent and duration of an impact.		
Mitigation Measure	Measure which would avoid, reduce, or remediate an impact.		
Non-statutory stakeholder	Organisations with whom the regulatory authorities may choose to engage who are not designated in law but are likely to have an interest in a proposed development.		
Polychaete	A class of segmented worms often known as bristleworms.		
Profound Impact	An impact which obliterates sensitive characteristics.		
The Project	The combination of the individual components listed below.		
	 Arklow Bank Wind Park Phase 2 Offshore Infrastructure: This includes all elements of the project consented under the existing Foreshore Lease. Arklow Bank Wind Park Phase 2 Onshore Grid Infrastructure: This relates to the onshore grid infrastructure. Arklow Bank Wind Park Phase 2 Operations and Maintenance Facility Onshore Infrastructure: This includes the onshore infrastructure at the OMF, with consent application to be submitted to Wicklow County Council Arklow Bank Wind Park Phase 2 Operations and Maintenance Facility Nearshore Infrastructure: This includes any required berthing pontoons/nearshore infrastructure, with Foreshore Lease application to be submitted to Department of Housing Planning and Local Government Arklow Bank Wind Park Phase 2 Eirgrid Upgrade Works: any non-contestable grid upgrade works, consent to be sought and works to be completed by Eirgrid. 		
The Proposed Development	Arklow Bank Wind Park Phase 2 Offshore Infrastructure: This includes all elements of the project consented under the existing Foreshore Lease.		
Project Design Envelope (PDE)	Also known as the Rochdale Envelope, the PDE concept is routinely utilised in both onshore and offshore planning applications to allow for some flexibility in design options, particularly offshore, and more particularly for foundations and turbine type, where the full details of the project are not known at application submission but where sufficient detail is available to enable all environmental impacts to be appropriately considered during the EIA.		
rms	Root Mean Square – square root of the mean value of the square of the quantity taken over a given time interval.		
SEL	Sound Exposure Level – a measure of the total sound energy of an event normalised to one second. This allows the total acoustic energy contained in events lasting a different amount of time to be compared on a like-for-like basis.		
Sensitive Receptor	Physical or natural resource, special interest or viewer group that may experience an impact.		
Sensitivity	Vulnerability of a sensitive receptor to change.		
Subtidal	Area extending from below low tide to the edge of the continental shelf.		
Water Body	A surface water body as defined under the Water Framework Directive (WFD) i.e. a river/stream, lake, transitional, coastal or groundwater body.		

Acronyms

Term	Meaning				
AA	Appropriate Assessment				
ABP	An Bord Pleanála				
ABWP	Arklow Bank Wind Park				
ACL	Atlantic Container Line				
AIS	Automatic Identification System				
amsl	Above Mean Sea Level				
AON	Apparently Occupied Nest				
ATC	Air Traffic Control				
ATS	Air Traffic Service				
BIOMOR	Benthic Biodiversity in the Southern Irish Sea Project				
CD	Chart Datum				
Cefas	Centre for Environment, Fisheries and Aquaculture Science				
CIA	Cumulative Impact Assessment				
CIEEM	Chartered Institute of Ecology and Environmental Management				
CRM	Collision Risk Model				
CSO	Central Statistics Office				
CSTP	Celtic Sea Trout Project				
DCCAE ¹	Department of Communications, Climate Action and Environment				
DHPLG ¹	Department of Housing, Planning and Local Government				
DMRB	Design Manual for Roads and Bridges				
dNMPF	draft National Marine Planning Framework				
DoD	Department of Defence				
EBA	European Boating Association				
EEA	European Economic Area				
EEZ	Exclusive Economic Zone				
EIA	Environmental Impact Assessment				
EIAR	Environmental Impact Assessment Report				
EIS	Environmental Impact Statement				
EMF	Electromagnetic Field				
EMODnet	European Marine Observation and Data Network				
EMP	Environmental Management Plan				
EPA	Environmental Protection Agency				
ESAS	European Seabirds at Sea				
EU	European Union				
EUNIS	European Nature Information System				
EUSeaMap	EMODnet broad-scale seabed habitat map for Europe				
FLO	Fisheries Liaison Officer				

¹ Following the formation of a new Government on 27 June 2020, these Department names have changed:

Department of Climate Action, Communications Networks and Transport

Department of Housing, Local Government and Heritage

Term	Meaning				
FLOWW	Fishing Liaison with Offshore Wind and Wet Renewables Group				
FMMS	Fisheries Management and Mitigation Strategy				
GHG	Greenhouse Gases				
GPS	Global Positioning System				
GVA	Gross Value Added				
HABMAP	Habitat Mapping for Conservation and Management of the Southern Irish Sea				
HDD	Horizontal Directional Drilling				
HOOW	Harnessing Our Ocean Wealth				
HLV	Heavy Lift Vessels				
HVAC	High Voltage Alternating Current				
HWM	High Water Mark				
IAA	Irish Aviation Authority				
IAIP	Integrated Aeronautical Information Package				
ICES	International Council for the Exploration of the Sea				
IEMA	The Institute of Environmental Management and Assessment				
IEF	Important Ecological Receptor				
IMC	Instrument Meteorological Conditions				
IMO	International Maritime Organisation				
INFOMAR	Integrated Mapping for the Sustainable Development of Ireland's Marine Resource				
INSPIRE	Infrastructure for Spatial Information in Europe				
IUCN	International Union for Conservation of Nature				
IWEA	Irish Wind Energy Association				
JNCC	Joint Nature Conservation Committee				
LAT	Lowest Astronomical Tide				
LWM	Low Water Mark				
MarESA	Marine Evidence based Sensitivity Assessment				
MarLIN	Marine Life Information Network				
MARPOL	International Convention for the Prevention of Pollution from Ships				
MCA	Maritime and Coastguard Agency				
MEC	Maximum Export Capacity				
MIDA	Marine Irish Digital Atlas				
MMMP	Marine Megafauna Mitigation Plan				
MMO	Marine Management Organisation				
MSA	Minimum Safe Altitude				
NECP	National Energy and Climate Plan				
NIS	Natura Impact Statement				
nm	Nautical mile				
NMFS	National Marine Fisheries Service				
NPWS	National Parks and Wildlife Service				
NSR	Noise Sensitive Receptor				
NtM	Notice to Mariners				
NTS	Non-Technical Summary				
NUC	Not Under Command				
OFLO	Offshore Fisheries Liaison Officer				

Term	Meaning				
OGI	Onshore Grid Infrastructure				
OMF	Operations and Maintenance Facility				
OPW	Office Public Works				
OREDP	Offshore Renewable Energy Development Plan				
OSI	Ordnance Survey Ireland				
OSP	Offshore Substations Platforms				
OSPAR	Oslo-Paris Conventions				
O&M	Operations and Maintenance				
PSR	Primary Surveillance Radar				
PINS	Planning Inspectorate				
Racon	Radar Beacon				
RAM	Restricted in their Ability to Manoeuvre				
RESS	Renewable Electricity Support Scheme				
RNLI	Royal National Lifeboat Institution				
Ro-Ro	Roll on Roll off				
RPO	Regional Policy Objective				
SAC	Special Area of Conservation				
SAR	Search and Rescue				
SAS	Surfers Against Sewage				
SCANS	Small Cetacean Abundance in the North Sea				
SCOS	Special Committee on Seals				
SNCB	Statutory Nature Conservation Body				
SPA	Special Protection Area				
SPL	Sound Pressure Level				
SPM	Suspended Particulate Matter				
SSC	Suspended Sediment Concentrations				
SWISS	South West Irish Sea Survey				
TSS	Traffic Separation Scheme				
UHF	Ultra-High Frequency				
UKFEN	UK Fisheries Economic Network				
UKHO	United Kingdom Hydrographic Office				
VFR	Visual Flight Rules				
VHF	Very High Frequency				
VMS	Vessel Monitoring System				
WCC	Wicklow County Council				
WTG	Wind Turbine Generators				
XLPE	Cross-linked Polyethylene				
Zol	Zone of Influence				
ZTV	Zone of Theoretical Visibility				

Units

Unit	Description			
CO _{2eq}	Carbon dioxide equivalent			
dB	Decibel (unit used to measure the intensity of sound)			
d	Depth			
ft	Feet			
km	Kilometres			
kV	Kilovolt (electrical potential)			
<	Less than			
m	Metre			
m/s	Metres per second (wind speed)			
mt	Million tonnes			
mg/l	Milligrams per litre			
MW	Megawatt (power; equal to one million watts)			
>	More than			
nm	Nautical Mile (distance; equal to 1.852 km)			
%	Percentage			
SEL	Sound Exposure Level			

1. INTRODUCTION

1.1 Overview

- 1.1.1.1 Arklow Bank Wind Park (ABWP) is an offshore wind farm project situated on and around Arklow Bank in the Irish Sea, approximately 6 to 13 km to the east of Arklow in County Wicklow. The ABWP Phase 2 is being developed by Sure Partners Limited ('the Developer') a wholly owned subsidiary of SSE plc.
- 1.1.1.2 A Foreshore Lease was granted by the Minister for Marine and Natural Resources for the offshore infrastructure of the ABWP in 2002, following a consent application that was supported by an Environmental Impact Statement (EIS). The Foreshore Lease permits the development of the primary offshore components of the ABWP which comprises wind turbines, including foundations and necessary associated works, offshore substations and all offshore cables associated with the wind park.
- 1.1.1.3 The Foreshore Lease covers an area of 60 km² (a rectangular block approximately 27 km long and 2.5 km wide) for the installation of the offshore infrastructure. Three offshore export cable routes were consented as part of the Foreshore Lease. One route comes ashore at Arklow (the Southern Landfall), whereas the remaining two routes make landfall approximately 4.5 km to the north of Arklow Harbour (the Northern Landfall) (see Figure 4.1).
- 1.1.1.4 Phase 1 of the ABWP, consisting of seven wind turbines, was constructed between 2003 and 2004 and is owned and operated by GE Wind Energy.
- 1.1.1.5 The Developer now proposes to build out Phase 2 of the ABWP offshore infrastructure (i.e. the remainder of the ABWP offshore infrastructure) (hereinafter referred to as 'the Proposed Development") under the terms of the Foreshore Lease. The Northern Landfall will be utilised for the Proposed Development.
- 1.1.1.6 The Developer has submitted an application to extend the long stop dates (hereinafter referred to as the 'Application for an Extension') for the remaining offshore infrastructure of the Project. An Environmental Impact Assessment Report (EIAR), which will provide an assessment of the offshore infrastructure, will support the Application for an Extension to the Minister for Housing, Planning and Local Government (the Minister).
- 1.1.1.7 This report forms the Environmental Impact Assessment (EIA) Scoping Report, which will be used to inform the content of the EIAR for the Proposed Development.
- 1.1.1.8 Arklow Bank Wind Park Phase 2 also requires onshore grid infrastructure (OGI), which will include an onshore substation and approximately 5 km of onshore underground export cable. An Operations and Maintenance Facility (OMF) will also be required, which will include an onshore building and jetty to be located at the quayside in Arklow Harbour.
- 1.1.1.9 Additional consent applications will be required for the OGI and the OMF. The OGI is considered transmission infrastructure and will require a direct application to the Strategic Infrastructure Division of An Bord Pleanála. The OMF will require a further separate application to Wicklow County Council and potentially a Foreshore Lease application to the Department for Housing Planning and Local Government (DHPLG) for any associated infrastructure required within the marine environment.
- 1.1.1.10 A separate EIAR will be prepared by the Developer to support the consent applications for the OGI and OMF, with associated separate EIA Scoping Reports.

1.2 Purpose of Scoping Report

1.2.1.1 This Scoping Report has been prepared by RPS, who have been appointed by the Developer to prepare the EIAR for the Proposed Development.

- 1.2.1.2 RPS has set out the scope of the EIAR along with the proposed approaches that will be used to enable an assessment of the likely significant effects of the Proposed Development.
- 1.2.1.3 The purpose of this Scoping Report is to provide stakeholders with information on the Proposed Development and allow for engagement with stakeholders on the key topics to be addressed in the EIAR, the baseline data sources, and assessment methodologies to be used to inform the EIA.
- 1.2.1.4 The Developer welcomes the opportunity for engagement with stakeholders and feedback on the Proposed Development and the scope (proposed content) of the EIAR. Responses received during EIA Scoping will be used to inform the assessments to be undertaken for the EIAR (see section 3 on Consultation Process).

1.3 **Project background**

1.3.1 Foreshore Lease

- 1.3.1.1 The Proposed Development was granted a Foreshore Lease in 2002 by the Minister for Marine and Natural Resources. The DHPLG now have the responsibility for administering the Lease on behalf of the Minister. The Foreshore Lease has a 99-year validity.
- 1.3.1.2 The Foreshore Lease permits the development of the Proposed Development which comprises wind turbines, including foundations and necessary associated works, offshore substations and all offshore cables associated with the wind park. The 2002 Foreshore Lease allows for the construction of up to 200 wind turbines with a Maximum Export Capacity (MEC) of 520 MW.
- 1.3.1.3 Phase 1, which consists of seven 3.6 MW wind turbines with a capacity of 25.2 MW was constructed between 2003 and 2004. Phase 1 is held under a sub-lease and is owned and operated by GE Wind Energy. The wind turbines are secured to the seabed on steel monopile foundations. The offshore export cable reaches landfall at an onshore substation in Arklow Harbour.
- 1.3.1.4 In 2018, and in relation to the Application for an Extension to the Minister, the Developer commenced further environmental assessments of the Proposed Development with the objective of updating the environmental assessments previously completed for the EIS (2001). These assessments are referenced where relevant in the scoping of the EIAR (see section 6).

1.3.2 Onshore project consents

1.3.2.1 Additional consents are required for the OGI and the OMF. The OGI is currently the subject of preapplication consultation with An Bord Pleanála (ABP) under section 182E of the Planning and Development Act 2000 (as amended). It is envisaged that as the OGI is considered transmission infrastructure it will require a direct application to the Strategic Infrastructure Division of ABP. The OMF will require a further separate application to Wicklow County Council (WCC) for the operations and maintenance (O&M) building and a Foreshore Lease application to the Department for any associated infrastructure required within the marine environment.

2. POLICY AND LEGISLATIVE CONTEXT

2.1 Renewable energy targets

- 2.1.1.1 In June 2018, the recast Renewable Energy Directive ((EU) 2018/2001) was agreed which included a binding renewable energy target for the EU of 32% by 2030.
- 2.1.1.2 Ireland has committed in its 2019 Climate Action Plan to increase the proportion of electricity generated from renewable energy sources from 30% to 70% by 2030, including a clear target of at least 3.5 GW of offshore wind by 2030, with an interim target of 1 GW by 2025. In June 2020, the Programme for Government included plans to achieve 5 GW capacity in offshore wind by 2030 off Ireland's Eastern and Southern coasts.
- 2.1.1.3 The Offshore Renewable Energy Development Plan (OREDP) supports the achievement of this target and the wider Irish Government ambition of decarbonising Ireland's electricity system, which will require additional renewable generation such as offshore wind by 2030 and out to 2050. With a sea area 10 times the size of the Irish landmass there is significant potential for offshore wind.
- 2.1.1.4 The National Energy and Climate Plan (NECP)² being developed by the Irish Government includes projections for offshore wind deployment by 2030. The Renewable Electricity Support Scheme (RESS) Design Paper states that Ireland will need to continue to demonstrate significant progress towards the 2030 target. The auction mechanism may also employ technology caps for established technologies like onshore wind to drive diversification and to support the development of emerging technologies including offshore wind. In line with the new Governance Regulation³, Ireland will need to install substantial amounts of new generation required by 2022 to close the gap from the 2020 targets. There is also a requirement to make incremental progress towards the 32% target by 2030, as set by the recast Renewable Energy Directive.

2.2 Draft National Marine Planning Framework

- 2.2.1.1 The draft National Marine Planning Framework (dNMPF) was published in November 2019. It contains overarching marine planning policies that are applicable to all proposals in Ireland's extensive maritime area. The dNMPF serves as a parallel to the National Planning Framework (see below), as it sets out the Government's long-term planning objectives and priorities for the management of our seas over a 20-year time frame.
- 2.2.1.2 The main driver for the dNMPF is the European Maritime Spatial Planning Directive and Harnessing our Ocean Wealth – An Integrated Marine Plan for Ireland. Public bodies are legally obliged to secure the objectives of the dNMPF.
- 2.2.1.3 Section 11 of the dNMPF relates to Offshore Renewable Energy and includes 11 planning policies, the following of which support the Proposed Development:

ORE Policy 1 - Proposals that assist the State in meeting the Government's target of generating at least 3.5GW of offshore renewable electricity by 2030 and proposals that maximise the long-term shift from use of fossil fuels to renewable electricity, in line with decarbonisation targets should be supported.

2.2.1.4 In addition, the dNMPF highlights the importance of co-existence and societal benefits of the marine area. The DHPLG intends to finalise the NMPF in 2020.

² The Draft NECP was open for public consultation until end of February 2019.

³ Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action [2018] (OJ L328/2018, 1–77).

2.3 National Planning Framework

2.3.1.1 The National Planning Framework 2040 (which is the Irish Government's high-level strategic plan for shaping the future growth and development of the country out to the year 2040) sets out National Policy Objective 44 which states:

"To support, within the context of the Offshore Renewable Energy Development Plan (OREDP) and its successors, the progressive development of Ireland's offshore renewable energy potential, including domestic and international grid connectivity enhancements".

2.4 Regional and local policy objectives

2.4.1.1 The Eastern and Midland Regional Assembly Regional Spatial and Economic Strategy (2019) includes a regional policy objective (RPO 10.24) on renewable energy resources, which is to:

"support the sustainable development of Ireland's offshore renewable energy resources in accordance with the Department of Communications, Energy and Natural Resources 'Offshore Renewable Energy Development Plan' and any successor thereof including any associated domestic and international grid connection enhancements."

2.4.1.2 Local policy documents are also supportive of offshore wind developments, for instance the Wicklow County Development Plan 2016 to 2022 has a specific policy (CCE7) to facilitate the development of offshore wind energy insofar as onshore facilities substations and connections to the grid that may be required. Furthermore, the Arklow and Environs Local Area Plan 2018 to 2024 acknowledges the benefits that the maritime sector, including offshore renewable energy, brings to the area and acknowledges that Wicklow County Council support the identification and realisation of economic opportunities within this sector.

2.5 Foreshore Lease

2.5.1.1 The Developer was awarded a Foreshore Lease (under the Foreshore Act 1933) for ABWP in 2002 by the Minister for Marine and Natural Resources. The Proposed Development will be built out under the existing Foreshore Lease, which is administered by the Minister, as the regulating authority. The Developer holds consent for the Proposed Development and, following consultation with the Department, is required to prepare an EIAR to support the Application for an Extension for the remainder of the ABWP.

2.6 Environmental Impact Assessment

- 2.6.1.1 EIA requirements derive from the EU Directive (85/337/EEC) (as amended by Directives 97/11/EC, 2003/35/EC, 2009/31/EC and 2011/92/EU) as well as 2014/52/EU on the assessment of the effects of certain public and private projects on the environment ('the EIA Directive'). The primary objective of the EIA Directive is to ensure that projects which are likely to have 'significant effects' on the environment are subject to an assessment of their likely impacts.
- 2.6.1.2 Article 4 of the EIA Directive makes provision for environmental impact assessments in respect of certain projects listed in Annexes I and II of that Directive. Annex I of the EIA Directive lists developments for which EIA is mandatory and Annex II lists projects which require a determination as to whether an environment impact assessment is required. Member States shall make that determination through a case-by-case examination or thresholds or criteria set by the Member State. Where a case-by-case examination is carried out, or thresholds or criteria are set for the purpose of Article 4 paragraph 2 of the EIA Directive, the relevant selection criteria set out in Annex III shall be taken into account.
- 2.6.1.3 Paragraph 3(i), Annex II includes:
 - Installations for the harnessing of wind power for energy production (wind farms).

- 2.6.1.4 As the Application for an Extension relates to a project for which a mandatory EIA is required and in order to facilitate a comprehensive assessment, it is proposed to submit an EIAR in relation to the Application for an Extension in order to ensure compliance with all relevant legal obligations.
- 2.6.1.5 The EIA Directive is given effect in Ireland through the Planning and Development Act 2000 (as amended). The European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296/2018) (hereafter 'the EIA Regulations 2018') came into operation on 1 September 2018 and transpose Directive 2014/52/EU into Irish Law and give further effect to Directive 2011/92/EU.
- 2.6.1.6 A significant body of guidance on the EIA is available and further information is provided in section 6.2.1.1.

2.7 Appropriate Assessment

- 2.7.1.1 The Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora ('the Habitats Directive') provides legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000. Natura 2000 is a European ecological network of Special Areas of Conservation (SAC), composed of sites hosting the natural habitat types listed in Annex I and habitats of the species listed in Annex II, to enable the natural habitat types and the species' habitats concerned to be maintained or, where appropriate, restored at a favourable conservation status in their natural range.
- 2.7.1.2 In Ireland, these Natura 2000 sites are designated as European Sites and include Special Protection Areas (SPAs), established under the EU Birds Directive (79/409/EEC, as codified by 2009/147/EC) for birds; and SACs, established under the Habitats Directive 92/43/EEC for habitats and species.
- 2.7.1.3 The Habitats Directive has been transposed into Irish law by Part XAB of the Planning and Development Act 2000 as amended and the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477/2011) as amended ('the Habitats Regulations').
- 2.7.1.4 An Appropriate Assessment (AA) is a separate but inter-related process to EIA, required under the Habitats Directive for any plan or project likely to have a significant effect on a European Site. The AA will be undertaken by the 'competent authority' as defined by the Habitat Regulations, informed by a Natura Impact Statement (NIS). While the NIS does not form part of the EIAR, the baseline presented within the EIAR will inform the NIS.
- 2.7.1.5 The Department of Environment, Heritage and Local Government (DEHLG) has published Appropriate Assessment Guidelines for Planning Authorities (DEHLG, 2010). In addition to this advice, the European Commission has published a number of documents which provide a significant body of guidance on the requirements of AA, including '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 (EC, 2001) and *'Managing Natura 2000 sites: The Provisions of Article 6 of the 'Habitats' Directive 92/43/EEC'* (EC, 2019), which set out the principles of how to approach decision making during the process. Other pertinent guidance documents will be identified and employed to inform the development of the NIS.

3. CONSULTATION PROCESS

3.1 Consultation – EIA Scoping

- 3.1.1.1 Consultation is an essential part of the EIA process. Consultation with the public, key stakeholders and interest groups provides an opportunity to:
 - Identify concerns about the Proposed Development and use these to inform the preparation of the EIAR;
 - Incorporate mitigation measures where possible into the design of the Proposed Development in the early stages;
 - Take into consideration the expertise and knowledge of local communities, experts and interest groups;
 - Encourage participation in decisions yet to be made;
 - Take into consideration concerns during the decision-making process and make the decision and conditions on the decision accordingly; and
 - Ensure members of the community are fully informed with up to date information about all aspects of the development throughout the full duration of the Proposed Development.
- 3.1.1.2 This Scoping Report is intended to set out the proposed content (scope) of the EIAR which will be prepared to support the EIAR for the Proposed Development.
- 3.1.1.3 This Scoping Report will support consultation with a range of stakeholders to inform the scoping of the EIAR. The Scoping Report will be issued to stakeholders to firstly inform them of the Proposed Development and secondly to request their comments and feedback on the scope of the EIAR. This consultation will also form part of the wider Project public consultation. Consultation will continue throughout the EIA process.
- 3.1.1.4 A full list of stakeholders consulted on this Scoping Report is provided in Appendix A.

3.2 **Public consultation**

3.2.1 Overview

- 3.2.1.1 The Developer is actively engaging with the public on the Proposed Development. During EIA Scoping, the Developer will present the findings of the EIA Scoping Report to the public and seek their feedback on environmental issues that should be considered in the EIAR. The Developer will continue communications with the public during the EIA process.
- 3.2.1.2 The formal consultation and engagement phase will last for four weeks. There are three core components to this phase of activity as set out below.

3.2.2 Media and advertising

3.2.2.1 For the duration of this phase, the Developer will advertise the process in local newspapers, local radio, and through geo targeted, paid posts on social media. The engagement phase will be launched via a press release, and a spokesperson will be made available to all media outlets, for further comment. A leaflet drop will also be delivered to homes in Arklow and Wicklow within an approximate 5 km radius of the shore.

3.2.3 Online

- 3.2.3.1 As a result of the implications of Covid-19, and associated restrictions, online activity is essential to the delivery of a robust consultation process. The website sserenewables.com/arklowbank will be launched to support the consultation process. This website will present clearly all of the available information relating to the Proposed Development, the ABWP Phase 2 OGI and the ABWP Phase 2 OMF. Critically it will also include contact details for the Developer, a feedback form to capture opinion, and details of alternative ways to engage on the Project.
- 3.2.3.2 In addition to the website, the Developer will host an online event, via youtube, where the Developer will deliver a presentation on the Project, and will take questions from viewers by email, or on the platform directly. This event will be advertised on the website, and on social media, and will be promoted in all advertising and media activity.
- 3.2.3.3 Dedicated briefings will also be provided to all elected representatives in the area, these will also be hosted online.

3.2.4 Real Time

- 3.2.4.1 The Developer will attempt to make its content available at a physical location in the county also, subject to Covid-19 restrictions permitting. The public exhibition would include project boards, a project brochure, and feedback forms made available in hard copy. The exact format of this event will be dictated by the prevailing Covid-19 guidelines of the time. This event will also be published widely in all external engagements.
- 3.2.4.2 In addition, the Project Community Engagement Manager and Fisheries Liaison Officer will be on call, as always. The contact details of the Community Engagement Manager will be widely promoted during this phase. The Community Engagement Manager will manage calls, and as necessary arrange tele or virtual meetings with the Developer as questions arise.
- 3.2.4.3 The Developer will also seek to present, in person, where possible to the relevant Municipal District Councils, at their meeting during the consultation phase.

4. DESCRIPTION OF DEVELOPMENT

4.1 Location

4.1.1.1 The Proposed Development will be located on and around Arklow Bank, which is located in the Irish Sea off the east coast of Ireland. The Foreshore Lease Area covers an area approximately 27 km long and 2.5 km wide, and is located approximately 6 to 13 km from the shore. The Foreshore Lease Area and consented offshore export cable routes are shown in Figure 4.1.

4.2 Offshore infrastructure

- 4.2.1 Overview
- 4.2.1.1 The key components of the Proposed Development comprise:
 - Up to 76 wind turbines (each comprising a tower section, nacelle and three rotor blades) and associated foundations (steel monopiles, steel tripod or gravity base);
 - Up to two Offshore Substations Platforms (OSPs) and associated foundations (steel monopiles, steel tripod or gravity base);
 - A network of inter-array cabling; and
 - Up to two offshore export cables utilising the consented offshore export cable routes.
- 4.2.1.2 The following sections provide a description of each component of the Proposed Development.



Figure 4.1: Location of the Proposed Development.

4.2.2 Wind Turbine Generators (WTG)

- 4.2.2.1 The Proposed Development will comprise up to 76 wind turbine generators (WTGs). The final number and design of wind turbines will depend on the rated capacity of the individual wind turbines to be used. The reduction in the number of wind turbines from the permitted 200 can be achieved due to the increase in output of models available on the market today.
- 4.2.2.2 The PDE will include wind turbines with a maximum tip height of c. 197 m above sea level (hereafter defined as Mean High Water (MHW)).

4.2.3 Offshore Substations Platforms (OSPs)

- 4.2.3.1 The Proposed Development requires up to two OSPs. The purpose of the OSPs is to transform the electricity generated by the wind turbines (at 66 kV) to a higher voltage (220 kV), allowing the power to be efficiently transmitted to shore.
- 4.2.3.2 The OSP topsides will measure up to 45 m length by 45 m width. These platforms will be located within the Lease Area and will contain switchgear, transformers, control equipment, auxiliary electrical equipment and a meteorological mast.
- 4.2.3.3 The topside structure of the OSP will also provide access and temporary or emergency accommodation for Proposed Development personnel, as well as areas for cable marshalling and other services.

4.2.4 Wind turbine and OSP Foundations

4.2.4.1 All wind turbine and OSP foundations will comprise either steel monopiles, steel tripod or gravity bases.

4.2.5 Scour Protection

- 4.2.5.1 Scour protection will be required at seabed level around the wind turbine and OSP foundations and cabling. This may include the use of:
 - Concrete mattresses: typically several metres wide and long, cast of articulated concrete blocks which are linked by a polypropylene rope lattice which are placed on and/or around structures to stabilise the seabed and inhibit erosion;
 - Rock: methods such as placement of layers of graded stones on and/or around structures to inhibit erosion or rock filled mesh fibre bags which adopt the shape of the seabed/structure as they are lowered on to it; or
 - Artificial fronds: mats typically several metres wide and long, composed of continuous lines of
 overlapping buoyant polypropylene fronds that create a drag barrier which prevents sediment
 in their vicinity being transported away. The frond lines are secured to a polyester webbing
 mesh base that is itself secured to the seabed by a weighted perimeter or anchors preattached to the mesh base.

4.2.6 Inter-array cabling

4.2.6.1 Inter-array cabling (66 kV AC) will connect the wind turbines to each other and to the OSP. The cable is likely to consist of a cross-linked polyethylene (XLPE) insulated aluminium or copper conductor submarine cable.

- 4.2.6.2 It is anticipated that the inter-array cables will be buried wherever possible. Where burial is not possible, cables will be protected in order to prevent movement or exposure of the cables over the lifetime of the Proposed Development. Both these methods will protect cables from other activities such as fishing or anchor placement, protect against the risk of dropped objects, and limit the effects of heat and/or induced magnetic fields. The preferred solution for protection (comprised of either concrete mattressing, rock or artificial fronds) will depend on seabed conditions along the route.
- 4.2.6.3 The total length of inter-array cabling required will depend upon the final wind turbine layout and ground conditions, but it is not expected to exceed 195 km. Each trench will be up to 10 m in width with a 2 m minimum burial depth.

4.2.7 Offshore transmission infrastructure

- 4.2.7.1 Three offshore export cable routes have been consented through the Foreshore Lease.
- 4.2.7.2 The offshore export cable will have a maximum length of 28.1 km, consisting of two cables of up to 14 km in length each. It is anticipated that up to two export cables will be installed in separate trenches, with each trench up to 10 m wide with a minimum 2 m burial depth. It is expected that a multi-cored 220 kV High Voltage Alternating Current (HVAC) cable will be used for the offshore export cables.
- 4.2.7.3 The offshore export cables will be buried in the seabed with an anticipated minimum cover of 2 m. The requirements for any cable protection (comprised of either concrete mattressing, rock or artificial fronds) will be defined during detailed design.
- 4.2.7.4 The method for installation through the intertidal zone at the landfall will depend on the ground conditions. Trenchless Technology such as Horizontal Directional Drilling (HDD) is being considered. HDD involves drilling a channel underground, into which the offshore export cable is installed, without the need to excavate an open trench. To achieve this, a drill rig is located inland of the landfall location and will comprise a working area containing the drill rig, electrical generator, water tank, mud recycling unit and temporary site office.

4.3 Construction

4.3.1 Construction sequence

- 4.3.1.1 The Proposed Development will be constructed following the general sequence below:
 - Step 1 Pre-construction confirmatory surveys (including geotechnical surveys);
 - Step 2 Seabed preparation;
 - Step 3 Foundation installation and scour protection installation;
 - Step 4 OSP topside installation/commissioning;
 - Step 5 Offshore export cable landfall installation;
 - Step 6 Offshore export cable offshore installation and cable protection installation;
 - Step 7 Inter-array cable installation and cable protection installation; and
 - Step 8 Wind turbine installation/commissioning.

- 4.3.1.2 Wind turbine and OSP foundations will be transported to the Lease Area (potentially from a preassembly harbour) and installed with any associated scour protection. Scour protection may comprise of a pre-installation (before foundation installation) filter layer and also a post installation armour layer.
- 4.3.1.3 The wind turbines will be transported to the Lease Area from the pre-assembly harbour where subassemblies (nacelle, rotor blades and towers) will be loaded onto an installation vessel or support vessel. Depending on the vessel selected, multiple wind turbine sub-assemblies may be transported to the Lease Area at any one time.
- 4.3.1.4 At the installation location, the wind turbine tower will be erected first, followed by the nacelle and blades. The blades may be installed one at a time or may be pre-assembled. Following installation of the wind turbine and connection to the necessary cabling, a process of testing and commissioning will be undertaken.

4.3.2 Indicative construction programme

- 4.3.2.1 The construction programme for the Proposed Development will depend on a number of factors, including:
 - Success in forthcoming Renewable Electricity Support Scheme auction which includes allocation for offshore wind projects;
 - Successful grid connection application to EirGrid and subsequent programme for connection; and
 - The availability and lead times associated with procuring and installing the Proposed Development components.
- 4.3.2.2 It is currently anticipated that construction of the Proposed Development will take place over a duration of three years.

4.4 **Operation and maintenance**

- 4.4.1.1 The Proposed Development will be designed to operate with minimum day-to-day intervention over its lifetime, with each wind turbine being monitored and controlled using onboard controls. Faults can typically be diagnosed by the wind turbine itself and shut down automatically if required. The in-turbine system will transmit faults to the onshore control room, where oversight and control will be provided as necessary. It is likely that each wind turbine and OSP control system will also be linked to the onshore monitoring facilities via the fibre optic cables contained within the inter-array and offshore export cables.
- 4.4.1.2 Typical operation and maintenance activities include:
 - Inspection and maintenance of foundations and ancillary equipment;
 - Inspection and maintenance of wind turbines and OSPs, including:
 - Local resets;
 - Scheduled maintenance; and
 - Unscheduled maintenance; and
 - Inspection and maintenance of the inter-array cables and offshore export cables.

4.5 Decommissioning

4.5.1.1 A decommissioning plan will be submitted to the Department for approval prior to decommissioning of the Proposed Development commencing, in line with the requirements of the Foreshore Lease. This will take into account good industry practice at that time.

4.6 Assessment of alternatives

4.6.1.1 The EIA Directive requires an EIAR to contain:

"A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects."

- 4.6.1.2 As the location of the Proposed Development has already been secured through the Foreshore Lease, it is proposed that the EIAR will address alternatives in terms of the design of the offshore infrastructure, for example, any design parameters considered but discounted (which may include layout of wind turbines, number of turbines, construction methodologies, construction phasing, and mitigation measures). The 'do nothing' scenario will also be assessed.
- 4.6.1.3 The consideration of alternatives will address the key issues associated with each option and record how environmental considerations were taken into account in deciding on the selected option.

5. EIA SCOPING

5.1 Background

- 5.1.1.1 The objective of this EIA scoping process is to identify potential environmental impacts for assessment which may be relevant to the Proposed Development.
- 5.1.1.2 The scoping process involves an assessment of a project's potential environmental impacts before deciding which should be brought forward for further consideration in the EIAR. Although scoping commences early in the process and informs the content and level of detail in the EIAR, it is noted that scoping is dynamic and only provides a starting point from which to launch an environmental assessment of the Proposed Development. It is regarded as an ongoing process throughout the evolution of the EIAR.
- 5.1.1.3 An initial scoping of potential impacts may identify those issues thought to be potentially significant in EIA terms, those where significance is unclear, and those thought to be not significant. The issues in the potentially significant category are brought forward, together with those in the uncertain category. Those considered to be not significant are not considered further in the EIAR. Figure 5.1 illustrates the environmental assessment process and the role of scoping in the overall EIA context.



Figure 5.1: The position of scoping an EIAR within the EIA process (source: Draft Guidelines on the Information to be Contained in an EIAR (EPA, 2017).

5.2 EIA Scoping guidance

- 5.2.1.1 The preparation of this Scoping Report has had regard to the following guidance documents:
 - Guidance on EIA Scoping (European Commission, 2001b);
 - Guidelines on the Information to be Contained in Environmental Impact Statements (EPA, 2002);
 - Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2003);
 - Draft Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2015);
 - Draft Guidelines on the Information to be Contained in Environmental Impact Statements (EPA, 2017);
 - Guidance on EIA Scoping (European Commission, 2017a); and
 - Guidance on EIA Report (European Commission, 2017b).
- 5.2.1.2 Having regard to the most recent guidance, based on the updated 2014 EIA Directive, scoping must be focused on issues and impacts which are:
 - Environmentally based;
 - Likely to occur; and
 - Significant and adverse.
- 5.2.1.3 As noted above, scoping for an EIAR is ongoing and iterative throughout the evolution of the EIAR. This allows the flexibility to adapt to any new issues, for example the discovery of additional impacts arising from detailed baseline studies resulting in the investigation of new impacts, alternatives and mitigation measures as necessary.

5.3 Technical scope

- 5.3.1.1 The factors to be examined in an EIAR are set out in the EIA Directive as amended as follows:
 - Population and human health;
 - Biodiversity;
 - Land, soil, water, air and climate;
 - Material assets, cultural heritage and the landscape;
 - The interactions between these factors; and
 - Risk of major accidents and disasters.

5.4 Consultation process feedback

5.4.1.1 This Scoping Report will be issued to the Department and stakeholders and made available to the public (see section 3) to seek their feedback on the proposed scope of the EIAR including the proposed assessment approaches and methodologies. All feedback will be recorded and considered by the Developer in the preparation of the EIAR. Furthermore, the feedback will be documented in the EIAR and signposted to where issues have been addressed.

6. EIA METHODOLOGY

6.1 Introduction

- 6.1.1.1 This section presents an outline of the EIA methodology to be employed for the Proposed Development. It outlines the methodology for the identification and evaluation of potential likely significant environmental effects and also presents the methodology for the identification and evaluation of potential cumulative and interactive impacts and potential transboundary effects.
- 6.1.1.2 A systematic and auditable evidence-based approach is proposed to evaluate and interpret potential effects on physical, biological and human environment receptors.

6.2 Legislation and guidance

- 6.2.1.1 The impact assessment will draw upon a number of key guidance documents and legislation including:
 - Council Directive 2011/92/EU of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment, as amended by Council Directive 2014/52/EU (the EIA Directive);
 - Foreshore Act 1933 (as amended);
 - European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. 296 of 2018);
 - European Commission Legislation and Commission guidance documents on EIA (including screening, scoping EIA Report, etc) (https://ec.europa.eu/environment/eia/eia-support.htm);
 - Environmental Protection Agency (EPA) Guidelines including: Guidelines on the Information to be Contained in Environmental Impact Statements (EPA, 2002); Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2003); Draft Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2015); and Draft Guidelines on the Information to be Contained in Environmental Impact Statements (EPA, 2017);
 - Guidance on Environmental Impact Statement (EIS) and Natura Impact Statement (NIS) Preparation for Offshore Renewable Energy Projects (Department of Communications, Climate Action and Environment (DCCAE), 2017);
 - Guidance on Marine Baseline Ecological Assessments and Monitoring Activities for Offshore Renewable Energy Projects (Part 1 and 2, DCCAE, 2018);
 - Best-Practice Guidelines for the Irish Wind Energy Industry (IWEA/SEAI, 2012);
 - Government of Ireland (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (August 2018);
 - Department of Housing, Planning and Local Government (2018) Circular PL 05/2018 -Transposition into Planning Law of Directive 2014/52/EU amending Directive 2011/92/EU on the effects of certain public and private projects on the environment (the EIA Directive) And Revised Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment;
 - Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (Chartered Institute of Ecology and Environmental Management (CIEEM), 2019);
 - The Design Manual for Roads and Bridges (DMRB) Volume 11: Environmental Assessment (and updates) (Highways Agency *et al.,* 2008);

- UK Planning Inspectorate Advice Note Nine: Rochdale Envelope (PINS, 2012); Advice Note Twelve: Transboundary Impacts (PINS, 2015b); and Advice Note Seventeen: Cumulative Effects Assessment (PINS, 2015c);
- A Review of Assessment Methodologies for Offshore Wind Farms (COWRIE METH-08-08) (Maclean *et al.*, 2009);
- Cumulative Impact Assessment Guidelines Guiding Principles for Cumulative Impact Assessment in Offshore Wind Farms (RenewableUK, 2013); and
- Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects (Cefas, 2012).
- 6.2.1.2 A full account of applicable legislation and guidance taken into account within the EIA methodology will be documented within the EIAR.

6.3 **Project Design Envelope approach**

- 6.3.1.1 The Project Design Envelope (PDE) approach (also known as the Rochdale Envelope approach⁴) will be adopted for the assessment of the Proposed Development. The PDE concept allows for some flexibility in project design options, particularly for foundations and wind turbine type, where the full details of a project are not known at the time of writing the EIAR. This approach is referred to in the DCCAE (2017) *Guidance on EIS and NIS Preparation for Offshore Renewable Energy Projects* and EPA (2017) *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*.
- 6.3.1.2 Whilst a range of options may be included in the PDE, sufficient detail is available to enable all environmental impacts to be appropriately considered, within a maximum design scenario, as part of the EIAR. For each impact assessment the maximum design scenario from within the range of potential options for each development parameter will be identified, and the assessment will be undertaken on this basis.
- 6.3.1.3 For example, if several turbine types are possible, then the assessment of the Proposed Development will be based on the turbine type known to have the greatest impact. This may be the turbine type with the largest footprint, the greatest tip height or the largest area of seabed required during construction, depending upon the topic under consideration. If, after undertaking the impact assessment it is shown that no significant effect is anticipated, it can be assumed that any project parameters equal to or less than those assessed in the PDE will have environmental effects of the same level or less and will therefore also have no significant effect upon the receptors for the topic under consideration.
- 6.3.1.4 The PDE will also include a number of 'designed-in' measures which will form part of the design of the Proposed Development. These standard measures applied to offshore wind development include lighting and marking of the wind farm, use of 'soft-starts' for piling operations etc, and as such, the determination of significance will consider implementation of these measures.
- 6.3.1.5 By employing the PDE approach the developer retains flexibility in design of the offshore wind farm and associated offshore infrastructure within certain maximum extents and ranges, all of which are fully assessed in the EIAR, whilst complying with the conditions of the Foreshore Lease.

⁴ The 'Rochdale Envelope' arises from two cases: R. v Rochdale MBC ex parte Milne (No. 1) and R. v Rochdale MBC ex parte Tew [1999] and R. v Rochdale MBC ex parte Milne (No. 2) [2000]. This approach requires consideration of the likely worst case in terms of variations within a project, but the detailed design of the Proposed Development and the variations should not vary beyond these limits.

6.4 Iterative approach

6.4.1.1 The approach to assessment will utilise an iterative approach, where impacts that are initially assessed as significant will be discussed with the Developer in order that changes to the design to reduce or offset the impact can be incorporated. The development of mitigation measures will also be considered as part of this iterative approach.

6.5 Identification of impacts and assessment of significant effects

Impacts and effects

- 6.5.1.1 The Proposed Development has the potential to create a range of impacts and effects with regard to the physical, biological and human environment. For the purposes of the EIAR, 'impact' will be used to define a change that is caused by an action. For example, the piling of turbine foundations (action) will result in increased levels of underwater noise (impact). Impacts can be defined as direct, indirect, secondary, cumulative and interactive. They can also be either positive or negative, although the relationship between them is not always straightforward. In addition, for certain impacts, the reversibility of an impact is relevant to its overall effect. An irreversible (permanent) impact may occur when recovery is not possible, or not possible within a reasonable timescale. In contrast, a reversible (temporary) impact is one where natural recovery is possible over a short time period, or where mitigation measures can be effective at reversing the impact.
- 6.5.1.2 The term 'effect' will be used in the EIAR to express the consequence of an impact. Using the foundation piling example again, the piling of turbine foundations (action) results in increased levels of subsea noise (impact), with the potential to disturb marine mammals (effect).
- 6.5.1.3 In general, the EIAR will determine the magnitude of the impact, the sensitivity of the receptor, and the significance of the effect, following the methodology outlined below. There may be some variations to the general EIA methodology where required by specific topic guidance, and where this is the case this will be explained within each relevant topic chapter.

Defining magnitude of impact

- 6.5.1.4 The magnitude of an impact is the combination of extent, duration, frequency and reversibility of an impact. For each impact assessed within the EIAR, a magnitude will be assigned. For each topic, the magnitude of impact will be categorised into the below scale:
 - Negligible;
 - Low;
 - Medium; or
 - High.
- 6.5.1.5 Scales of magnitude will be defined for each subject area within the EIAR that is relevant to the particular receptor being assessed. Design of such topic-specific scales will draw upon relevant external guidance and specialist knowledge relevant to each topic.

Defining sensitivity of receptor

- 6.5.1.6 Receptors will be defined as the physical or biological resource or user group that would be affected by the potential impacts. Potential receptors will be informed by baseline studies.
- 6.5.1.7 In defining the sensitivity for each receptor, the vulnerability, recoverability and value/importance of that receptor will be taken into account.
- 6.5.1.8 The sensitivity of each receptor will then be defined for each topic according to the below scale:

- Negligible;
- Low;
- Medium; or
- High.

Evaluation of significance of effect

6.5.1.9 Effect is the term used to express the consequence of an impact (expressed as the 'significance of effect'). The significance of an effect will be determined by the consideration of the magnitude of impact alongside the sensitivity of receptor. In order to ensure consistency, a matrix approach will be adopted for the EIAR as presented below in Table 6.1.

Table 6.1: Matrix used for the assessment of the	e significance of the effect.
--------------------------------------------------	-------------------------------

	Magnitude of impact					
Sensitivity of receptor		Negligible	Low	Medium	High	
	Negligible	Imperceptible	Imperceptible or slight	Imperceptible or slight	Slight	
	Low	Imperceptible or slight	Imperceptible or slight	Slight	Slight or moderate	
	Medium	Imperceptible or slight	Slight	Moderate	Moderate or major	
	High	Slight	Slight or moderate	Moderate or major	Major or Profound	

- 6.5.1.10 The significance of effect levels are adapted from the EPA (2017) *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (Figure 3.5 Chart showing typical classification), described as follows:
 - Profound: An effect which obliterates sensitive characteristics;
 - Major: An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment;
 - Moderate: An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment;
 - Slight: An effect which causes noticeable changes in the character of the environment without affecting its sensitivities; and
 - Imperceptible: An effect capable of measurement but without significant consequences.
- 6.5.1.11 For the purposes of the EIAR, any effects with a significance level of slight or less will be concluded to be not significant.

6.6 Competent experts

6.6.1.1 Article 5(3)(a) of the 2014 EIA amended Directive requires that "the developer shall ensure that the environmental impact assessment report is prepared by competent experts" to ensure the completeness and quality of the EIAR. In this regard, the EIAR will be prepared by a team of competent, technical experts who have the knowledge and understanding of best science to assess the potential impacts associated with the Proposed Development and where required develop mitigation measures (including monitoring where required).

6.7 Cumulative Impact Assessment

- 6.7.1.1 The EPA (2017) defines cumulative effects as "the addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects". This includes the impact of other relevant developments that were not present at the time of baseline data collection or survey.
- 6.7.1.2 The Cumulative Impact Assessment (CIA) will consider the likely cumulative impacts arising from the Proposed Development alongside the likely impacts of other development activities in the vicinity of the Proposed Development, based on publicly available information. The assessment will also specifically consider the likely cumulative impacts arising from the Proposed Development alongside the other ABWP Phase 2 Projects (including ABWP Phase 2 OGI, ABWP Phase 2 OMF and ABWP Phase 2 Eirgrid Grid Upgrade Works).
- 6.7.1.3 The following guidelines will be considered in undertaking the CIA:
 - The EPA Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2017);
 - Guidelines on the Assessment of Indirect and Cumulative Impacts as well as Impact interactions (European Commission, 1999);
 - Guiding Principles for Cumulative Impact Assessment in Offshore Wind Farms (RenewableUK, 2013); and
 - Advice Note Seventeen: Cumulative Effects Assessment. Approach to Cumulative Impact Assessment methodology UK Planning Inspectorate (PINS) (2015c).
- 6.7.1.4 A fundamental requirement of undertaking CIA is to identify those projects, plans or activities with which the Proposed Development may interact to produce a cumulative impact. This process is referred to as 'screening'. A specialised process has been developed in order to methodically and transparently screen the large number of projects, plans and activities that may be considered cumulatively alongside the Proposed Development. This three-staged approach is used to gather information on other projects, plans and activities within the defined cumulative Zone of Influence (ZoI) for each topic considered in the EIAR. The initial long list of projects outlined in Stage 1 is reduced in Stage 2 on an assessment of criteria/assumptions used to determine whether to include or exclude other existing/approved developments. Information is then gathered on the projects, which is used to inform the topic-specific screening carried out by each topic specialist at Stage 3.
- 6.7.1.5 Searches for applications for Foreshore Licences and Leases, dredging and dumping licences, and other infrastructure projects will be undertaken for Ireland, Northern Ireland, England, Scotland and Wales, using a range of planning websites under each jurisdiction. The status of each project will be identified (i.e. application, consented, under construction, operational) and approximate distances to the Proposed Development provided. In order to provide an initial screening of these projects, it is proposed that the following assumptions will apply:
 - Temporal Overlap: A construction commencement date of 2023 has been assumed for the Proposed Development with a three year construction period. Any licence/lease/consent which expires before end of 2022 will be excluded on the basis of no temporal overlap with the Proposed Development;

- Any Foreshore Licence applications for Site Investigation activities greater than two years old will be assumed to be completed and will therefore be excluded; and
- All Foreshore Licence applications that were in consultation before 2016 (i.e. more than five years ago), but where no further action has since been taken to progress application to consent stage, will be excluded on the basis that such projects are not expected to proceed.
- 6.7.1.6 The list of other projects and plans will be tailored to the cumulative study area (or ZoI) identified for each of the key specialist disciplines. Based on our current understanding of the Proposed Development and the key sensitive receptors, it is expected that the largest ZoI will span the Irish Sea and beyond to consider mobile species with large foraging distances such as gannet. These projects and plans will then be screened in accordance with a set of defined criteria to identify projects for assessment in each chapter. The maximum design scenario for each relevant cumulative impact will be identified and assessed, and the CIA will be undertaken on the basis of information presented in the EIARs for the other projects, plans and activities.
- 6.7.1.7 A tiered approach to assessment will be adopted, as follows:
 - Tier 1: the Proposed Development considered alongside:
 - ABWP Phase 2 Onshore Grid Infrastructure (OGI);
 - ABWP Phase 2 Operations and Maintenance Facility (OMF); and
 - ABWP Phase 2 Eirgrid Grid Upgrade Works.
 - Tier 2: the Proposed Development considered alongside Tier 1 projects, as well as:
 - ABWP Phase 1;
 - Other project/plans currently under construction;
 - Other projects/plans with consent;
 - Other projects/plans in the consenting process; and
 - Other projects/plans currently operational that were not operational when baseline data were collected, and/or those that are operational but have an ongoing impact.
- 6.7.1.8 This tiered approach is adopted to provide an explicit assessment of the ABWP Phase 2 Project as a whole.
- 6.7.1.9 In relation to Tier 2 projects, it is important to set out the approach for assessing those offshore wind farms designated as 'Relevant Projects', which includes those projects that either applied for or were granted a lease under the Foreshore Act 1933. It is understood from the Government announcement on 19 May 2020 that a number of aspects of these projects can be updated by way of an application under the new marine planning regime. The CIA will therefore acknowledge that these projects are being brought forward in the future, but as there is not yet specific detail on any updated project parameters, the approach taken will be, in so far as possible, to conduct a high level assessment.

6.8 Transboundary assessment

- 6.8.1.1 The need to consider such transboundary impacts has been embodied by the United Nations Economic Commission for Europe (UNECE) Convention on EIA in a Transboundary Context (commonly referred to as the 'Espoo Convention'). The Convention requires that assessments are extended across borders between Parties of the Convention when a planned activity may cause significant adverse transboundary impacts. The Espoo Convention has been ratified by the European Union, Ireland and the United Kingdom. It is aimed at preventing, mitigating and monitoring environmental damage by ensuring that explicit consideration is given to transboundary environmental factors before a final decision is made as to whether to approve a project. The Espoo Convention requires that the Party of origin notifies affected Parties about projects listed in Appendix I and likely to cause a significant adverse transboundary impact.
- 6.8.1.2 Article 7 of the EIA Directive introduces similar requirements concerning projects carried out in one Member State but likely to have significant effects on the environment of another. While the EIA Directive provides a definition of the term 'project' the 1991 Espoo Convention uses the term 'proposed activity'. The principal obligation is in respect of information and consultation and is imposed by Article 7(4) of the amended EIA Directive:

"The Member States concerned shall enter into consultations regarding, inter alia, the potential transboundary effects of the project and the measures envisaged to reduce or eliminate such effects and shall agree on a reasonable time-frame for the duration of the consultation period."

- 6.8.1.3 The EPA Draft Guidelines (2017) outline that in the case of an EIAR, for any project that is likely to cause significant transboundary effects, contact with the relevant authorities other Member States should be made. This will establish a consultation framework to consider and address these effects.
- 6.8.1.4 A screening exercise has been undertaken to identify potential significant transboundary effects on another state arising from the Proposed Development (see Appendix B).

6.9 Interactions

- 6.9.1.1 Article 3(1) of the 2014 EIA Directive requires that the interaction between the environmental factors (population and human health, biodiversity, land, soil, water, air and climate, material assets, cultural heritage and the landscape) is identified, described and assessed in the EIAR.
- 6.9.1.2 The interactions assessment will be carried out with regard to the following guidelines:
 - The Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (EC, 1999);
 - EPA Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (2017); and
 - PINS Rochdale Envelope Advice Note (Advice Note Nine) (PINS, 2012).
- 6.9.1.3 The assessment of potential interactions will be carried out considering two levels of potential effect:
 - Project lifetime effects: effects that occur throughout more than one phase of the Proposed Development (construction, operational and maintenance and decommissioning) interacting to potentially create a more significant effect upon a receptor than if just assessed in isolation in a single phase; and
 - Receptor-led effects: effects that interact spatially and/or temporally resulting in interactive effects upon a single receptor. Receptor-led effects might be short term, temporary or transient effects, or incorporate longer term effects.
6.9.1.4 The interactive effects chapter will provide a descriptive assessment outlining the potential for individual effects to combine, incorporating qualitative and, where reasonably possible, quantitative assessments, to potentially create additional effects that may be of greater significance than the individual effects acting in isolation.

6.10 Interface with onshore infrastructure

- 6.10.1.1 The EIAR for the Proposed Development will assess the potential environmental impacts associated with the offshore infrastructure up to the High Water Mark (HWM). A separate EIAR will be prepared for the OGI, which will assess the potential impact of the onshore grid infrastructure (i.e. the onshore cable and onshore substation) from the HWM.
- 6.10.1.2 The Developer will ensure that there is no gap in the assessment of the ABWP Phase 2 (offshore infrastructure and OGI) through regular discussion with the Project specialists on the assessments at the onshore/offshore interface.

7. SCOPING OF EIAR

7.1 Introduction

- 7.1.1.1 The scoping of an EIAR is the process of deciding what information should be contained in an EIAR and what methods should be used to gather and assess that information. Scoping is concerned with identifying those aspects of the environment where there is an interaction with a project, either direct or indirect, positive or negative, and as a consequence where there is potential for likely and significant effects, which need to be assessed.
- 7.1.1.2 It is proposed that the following list of environmental topics will be examined in the EIAR for the Proposed Development. This list is presented with reference to the factors to be examined as set out in the EIA Directive:
 - Land, Soil and Water:
 - Coastal processes.
 - Biodiversity:
 - Benthic subtidal and intertidal ecology;
 - Fish, shellfish and sea turtle ecology (including underwater noise);
 - Marine mammals (including underwater noise);
 - Offshore ornithology.
 - Population and human health:
 - Commercial fisheries;
 - Shipping and navigation;
 - Civil and military aviation;
 - Population and human health; and
 - Airborne noise.
 - Landscape:
 - Seascape, landscape and visual amenity.
 - Material assets:
 - Infrastructure and other users.
 - Cultural heritage including archaeological heritage:
 - Marine archaeology.
 - Air and Climate:
 - Air quality and climate.
 - Interactions.

- 7.1.1.3 The geographic scope of the EIA will vary for each environmental topic and will depend on the nature and sensitivity of the receiving environment and the pathway through which impacts may be received (e.g. via air, water etc.). The geographic scope of each EIA topic will be clearly defined in the EIAR. Further information on each topic study area is provided below.
- 7.1.1.4 The potential impacts of the Proposed Development during the construction, operational and maintenance and decommissioning phases will be assessed in the EIAR. The EIAR will include assessment of impacts over the short, medium and long term as appropriate.
- 7.1.1.5 An initial EIA scoping exercise has been carried out, the results of which are set out in the following sections. For each environmental topic proposed to be included in the EIAR, the following headings are discussed:
 - Study area;
 - Data sources;
 - Baseline environment;
 - Potential impacts;
 - Impacts scoped out of further assessment;
 - Proposed assessment methodology; and
 - Designed-in measures and mitigation.
- 7.1.1.6 The most up to date available standards, guidelines and data have been referenced in this Scoping Report, however, it is recognised that amendments and updates will become available from time to time during the EIAR phase of the Proposed Development. The EIAR will reflect the most up to date information available at that time.
- 7.1.1.7 Section 8 provides a summary of the topics that will be further assessed in the EIAR.

7.2 Coastal processes

- 7.2.1.1 This EIAR chapter will consider the potential impacts the Proposed Development could have on coastal processes during the construction, operational and maintenance and decommissioning phases.
- 7.2.1 Study area
- 7.2.1.1 The Coastal Processes Study Area is defined as one tidal excursion from the Foreshore Lease Area and extends inshore to the High Water Mark (HWM), as shown in Figure 7.1. A tidal excursion is the distance which the tide (i.e. and therefore suspended material) travels during the course of a single spring tide cycle, i.e. the largest tidal excursion. It is used to define the study area as any material which remains in suspension would be transported back towards the Foreshore Lease Area on the returning tide. It should also be noted that although this area will form the focus of the study, the model extent and analysis will not be limited to this area.
- 7.2.1.2 In terms of interactions, this region is defined by the tidal excursion and is used to determine if a project is able to potentially reach the tidal extent of the proposed development. It should be noted that this is would only apply for material which has been carried in suspension and is deposited on slack water as suspended sediment plumes would largely travel in unison.



Document Name: EOR0765_SCO_003_01_PhysicalProcesses_AdmiraltyChart1121_200917

Figure 7.1: Coastal Processes Study Area.

7.2.2 Data sources

Desktop data

- 7.2.2.1 The baseline will be established using data on bathymetry, tidal regime, meteorological information, wave climate and seabed sediments. Data sources will include the 2001 EIS and more recent studies most notably the INFOMAR (Integrated Mapping for the Sustainable Development of Ireland's Marine Resource) data.
- 7.2.2.2 A study undertaken specifically for the 2001 EIS (Murphy Dollard, 2001) examined the generalised baseline conditions and explored the basic flow and wave transformation conditions which was then used to determine the sediment transport characteristics. The study was undertaken by an assessment of a cross section of the bank.
- 7.2.2.3 The INFOMAR seabed survey has collected bathymetric (and sediment samples) around the Irish Coast and this data is publicly available under the European INSPIRE (Infrastructure for Spatial Information in Europe) project. Most areas of the Irish Sea have been re-surveyed with the Arklow Bank being surveyed in 2016, as illustrated in Figure 7.2.

Site-specific survey data

- 7.2.2.4 A number of boreholes were drilled to inform the 2001 EIS, extending to a depth of 25 m below seabed level. These are indicated on Figure 7.2.
- 7.2.2.5 Geophysical survey data were collected in 2019, and will be used to inform the baseline (Ultrabeam Ltd, 2019).
- 7.2.3 Baseline environment
- 7.2.3.1 Arklow Bank is a shallow water sandbank in the Irish Sea that is situated approximately 6 to 13 km off the coast near Arklow. The sandbank is approximately 25 km long and orientated roughly north-south and experiences strong currents, sediment transport and breaking waves. The following sections outline the baseline conditions associated with the Coastal Processes Study Area (Figure 7.1).

Bathymetry

- 7.2.3.2 The dimensions of this shallow offshore sandbank within the Lease Area measure about 25 km by 2.5 km at the widest point. On the bank, water depths vary between 0.6 m and 25 m (relative to lowest astronomical tide (LAT) which is Chart Datum (CD) Arklow), with shallower areas particularly occurring in the vicinity of the ABWP Phase 1 wind turbines. The general morphology of this feature is oriented roughly in a north-south direction as illustrated in the Admiralty Chart 1121 presented in Figure 7.2. There is a large variation in depth within the Lease Area, beyond the bank extents depths are present in excess of 40 m CD.
- 7.2.3.3 The crest of the sandbank consists of a smooth seabed with areas of localised bedforms, attributed to the high current regime. Water depths vary along the bank crest with water depths along the north-south orientated bank crest varying between 0.6 m and 4.0 m (relative to lowest astronomical tide (LAT) which is Chart Datum (CD) Arklow). Beyond the bank crest water depths increase, with the angle of the crest slope being more pronounced on the eastern side.



Document Name: EOR0765_SCO_007_01_PhysicalProcesses_BoreholeLocations_200917

Figure 7.2: Borehole locations and Arklow Bank bathymetry.

Hydrography

- 7.2.3.4 The United Kingdom Hydrographic Office (UKHO) states that the mean tidal range at the Arklow Standard Port is approximately 0.5 m however in the region of Arklow Bank it may be double this value due to both the location of the gauging station within the Harbour and bathymetry at the bank. Storm surge may increase surface elevations by up to 1.0 m for the 50-year event.
- 7.2.3.5 The sandbank is subject to strong currents with the general direction of flow in the offshore regions of the bank towards the north-northeast during flood and towards south-southwest during ebb. Spring tidal current speeds are in excess of 2 m/s towards the north end of the bank on both flood and ebb tides whilst to the south the peak tidal currents are around 1.7 m/s.

Waves

- 7.2.3.6 Breaking waves are often present on parts of the bank, even during low swell conditions. There is a dominance of southerly waves attributed to large Atlantic swells entering the Irish Sea and the dominance of westerly winds.
- 7.2.3.7 The nearshore wave climate is influenced by shallowing water depths as waves enter the Irish Sea. Waves are refracted towards the coast with the majority of waves coming from south-southwest (southwest to south-southeast) (Panigrahi *et al.*, 2009). Large waves (exceeding 2 m) have been recorded for nearly all directions between 0 and 300 degrees. Due to the shallow bathymetry at the Arklow Bank it is apparent that a large proportion of the waves break when reaching the bank, as they are higher than the breaker index 0.78 d, where d is the water depth. The bank therefore acts as a natural breakwater.

Sedimentology

- 7.2.3.8 The Arklow Bank is sand and gravel dominated with mobile surface sediments (Sure Partners Ltd., 2000). Medium sand is mainly located at upper levels (< 15 m) with a gravel-sand with gravel fractions located at greater depths. The surrounding seabed of the Coastal Processes Study Area is covered with sand and gravel deposits.
- 7.2.3.9 The substratum ranges from sandy shell to gravel to the west, north and south of the bank to coarse shell and gravel and some rock to the east of the bank. The bank itself consists of mainly sand, cobbles with shells and pebbles at the northern end of the bank and fine sand at the southern end. Below the bank core, quaternary soils predominantly consist of very dense sand, gravel and gravelly sand. However, a thin clay layer was encountered in only one of the initial borings at the north end of the bank (Murphy Dollard, 2001).

Suspended sediments

- 7.2.3.10 Sediment in the Coastal Processes Study Area is dominated by sand or slightly gravelly sand. Recent sampling campaigns (Arklow Energy Ltd., 2016) in the area confirm that the bank is comprised of sandy sediments with around 90% of the sediment composition being between 2 mm and 63 µm. The significant proportion of relatively fine material coupled with the high energy environment in the region would indicate an area with potentially high background levels of suspended sediment.
- 7.2.3.11 The Centre for Environment, Fisheries and Aquaculture Sciences (Cefas) Climatology Report 2016 (Cefas, 2016) shows the spatial distribution of average non-algal Suspended Particulate Matter (SPM) for the majority of the UK continental shelf. For the period 1998 to 2005 the largest plumes are associated with large rivers such as the Thames Estuary, The Wash and Liverpool Bay, which show mean values of SPM above 30 mg/l. Using this study, it is estimated that the average SPM associated with the Arklow Bank over this period is approximately 10 mg/l to 15 mg/l as shown in Figure 7.3. The higher levels are experienced more commonly in the winter months however, due to the tidal influence, even during summer months the levels remain elevated.

Sediment transportation

- 7.2.3.12 Given the nature of the strong tidal current in the area it is likely that this current is the driving force behind the movement of sediment and the formation of Arklow Bank. Some studies (including the 2001 EIS which compared the spring 2000 survey and Admiralty Charts) suggest Arklow Bank has apparently moved slightly eastward. It should be noted that Admiralty Charts are prepared using a Transverse Mercator projection and effectively linearise longitude and latitude scales and therefore care must be taken when plotting survey data directly. When the raw soundings from the most recent Admiralty Chart are transferred to the same projection as the survey these changes are not apparent. Figure 7.4 demonstrates that in the Admiralty data (survey data provided by the Arklow Harbour Commissioners 2000) and survey data collected by INFOMAR in 2016, the banks are aligned.
- 7.2.3.13 A further detailed bathymetric survey was undertaken in 2019. This data was compared with the INFOMAR data collected in 2016 and indicates that although there is movement within the sand waves, the crest of the bank remains stationary and the alignment has not changed during this period.
- 7.2.3.14 On Arklow Bank the presence of sand waves provides evidence of seabed sediment transport occurring in a northeasterly direction to the west of the bank and southeasterly to the east. Sand waves are present on all sides of the bank, and can measure up to 150 m wave length and up to 10 m amplitude as shown in Figure 7.5.



Document Name: EOR0765_SCO_006_00_PhysicalProcesses_Suspended_Sediment_200415

Figure 7.3: Average suspended particulate matter 1998 to 2015.



Figure 7.4: Admiralty Chart 1787 data and Arklow Bank Survey 2016 bathymetry.



Document Name: EOR0765_SCO_005_00_PhysicalProcesses_SandWaves_200915



7.2.4 Potential impacts

7.2.4.1 Table 7.1 presents the potential impacts that could arise from the Proposed Development during the construction, operational and maintenance and decommissioning phases.

Table 7.1: Impacts to be scoped in for the Coastal Processes EIAR chapter.

Potential	Phase			Justification			
impact	С	0	D				
Increased suspended sediment concentrations and associated deposition	•	•	•	 Construction and decommissioning phase There is potential for increased suspended sediment concentrations and associated deposition associated with seabed preparation activities in advance of the installation of offshore infrastructure, the installation of piled foundations via drilling, and cable installation activities (including HDD). The largest potential release would arise from augured (drilled) piles where the material would be jetted and released to the water column as a plume. The borehole logs indicated that relatively homogenous material exists to core depths with only the level of compaction increasing. Therefore, the material released would be native to the surroundings and given the mobile nature of the seabed it would be assimilated. This type of seabed material would indicate that piles may be driven (as undertaken for the installation of the ABWP Phase 1 foundations) however the augured method would present the largest potential influence on background conditions and would be used for the purposes of the assessment. Inter-array and offshore export cables would likely be installed in trenches by ploughing or jetting within the seabed sand/gravel layer, or where the gravel layer is thin, in the underlying clays. Therefore, smaller sand particles within the sediment would have the potential to be raised into suspension during this phase of construction. The potential for increased suspended sediment concentrations and associated deposition during the decommissioning phase will also be considered. Operational and maintenance phase There is potential for increased suspended sediment concentrations and associated deposition during the accommissioning phase will also be considered. 			
Presence of infrastructure may lead to changes to tidal currents, wave climate and sediment transport	×	•	×	 to be similar to those described during the construction phase. Operational and maintenance phase The presence of the wind turbines and OSP structures will cause some localised changes in tide and wave climate. The magnitude of these changes will be quantified in terms of the influence of individual structures and also the potential for interaction of effects. The impact of the Proposed Development on the tides would be assessed by comparing the wave climate and tidal currents distribution within the Lease Area and surrounding area with and without the presence of the Proposed Development. Changes in tidal flow and wave climate have the potential to alter sediment transport regimes both in the vicinity of the Proposed Development and closer inshore. The ABWP Phase 1 wind turbines on the bank have demonstrated the need for scour protection (Whitehouse <i>et al.</i>, 2006) and the possible localised accretion where this is applied. This will be particularly important where larger gravity structures may be proposed for wind turbines located in deeper water. 			
Installation of infrastructure may affect water quality	•	*	×	 Construction phase Construction activities undertaken out to a distance of 1 nautical mile, such as trenching of the offshore export cable and activities at the HDD exit point, will be assessed in terms of the Water Framework Directive (WFD). Any impact in terms of the biological elements from the aquatic and terrestrial ecology assessment will be considered in the context of the WFD ecological status and environmental objectives of water bodies. Any potential for hazardous or priority hazardous substances to affect surface and ground waters chemical status would be investigated. Baseline studies indicate in the vicinity of the northern landfall 1.5 m layer of sand overlays a 2 m till layer and no contamination is present; therefore only native material is likely to be brought into suspension by the construction activities. 			

C = Construction phase, O = Operational and maintenance phase, D = Decommissioning phase.

7.2.5 Impacts scoped out of further assessment

7.2.5.1 Table 7.2 presents the potential impacts proposed to be scoped out of the Coastal Processes EIAR chapter.

Table 7.2: Impacts to be scoped out of the Coastal Processes EIAR chapter.

Potential impact	Ju	istification
Changes to seabed morphology due to depressions left by jack- up vessels	•	Installation of offshore infrastructure may require the use of jack-up vessels. The potential for jack-up vessel spud-cans to affect the sediment regime has been scoped out of the assessment. Jack-up footprint depressions would likely persist after jack-up operations have been completed, although it is likely that these would infill over time. It is not anticipated that jack-up vessel footprints will have implications for the sediment regime and therefore it is proposed that this impact is scoped out of the assessment.

7.2.6 Proposed assessment methodology

- 7.2.6.1 A numerical modelling assessment will be undertaken to inform the EIAR. This will be undertaken using the MIKE software developed by DHI (www.dhigroup.com). The MIKE suite of hydrodynamic modules is a global standard, used internationally for many environmental, planning, legal, engineering and other predictive applications. The key to the MIKE suite of computational models is that each module may be applied to a single model mesh and then the modelling of combined (coupled) parameters may be undertaken.
- 7.2.6.2 The MIKE21fm coupled modules would be used to model baseline wave climate, tidal flows and sediment transport, using a model which, whilst providing sufficient detail to simulate the necessary parameters, is also computationally efficient by utilising a flexible mesh comprised of the most up-to-date bathymetric data. The model would be driven using boundary conditions derived from the Irish Sea model which was developed by RPS. It is currently used for live coastal tide and surge forecasting on behalf of the Office of Public Works (OPW).
- 7.2.6.3 The computational model applied in the baseline study will be amended to include the wind turbine and OSP structures (and any associated scour and cable protection) to quantify the change in sediment transport and wave climate. Similarly, sediment will be released into the water column to replicate the construction phase works during the installation of the foundations, inter-array and offshore export cabling and the sediment dispersion and fate will be gauged. The impact of the cable laying on the level of suspended sediments would be modelled by releasing the appropriate amount of sand particles into the water column at 1 m to 2 m above the seabed and evaluated in the context of existing background levels. This information will be used to inform the assessments of the biological environment topics.

7.2.7 Designed-in measures and mitigation

- 7.2.7.1 The following designed-in measures are proposed in relation to Coastal Processes:
 - Scour protection: use of scour protection around offshore foundations, as described in section 4.
- 7.2.7.2 Any further mitigation requirements for coastal processes will be dependent on the significance of the effects. Based on the experience provided by ABWP Phase 1 construction and operation it is anticipated at this time that no further mitigation measures will be necessary during the construction, operational and maintenance or decommissioning phases.

7.3 Noise (airborne and underwater)

- 7.3.1.1 The Airborne Noise EIAR chapter will consider the potential impacts of the Proposed Development arising from airborne noise generated during the construction, operational and maintenance and decommissioning phases, and will be supported by an Airborne Noise Technical Report.
- 7.3.1.2 A Subsea Noise Technical Report will also be prepared, which will inform the Fish, Shellfish and Sea Turtle EIAR chapter and Marine Mammals EIAR chapter.
- 7.3.1.3 Vibration is addressed within section 7.5 in relation to biological receptors.
- 7.3.2 Study area
- 7.3.2.1 The Airborne Noise Study Area will comprise noise sensitive receptors located within 500 m of the shoreline between Magherabeg to the north and Kilgorman to the south. The Airborne Noise Study Area will be confirmed following review of the noise modelling results.
- 7.3.2.2 The study area for the underwater noise assessment is dependent on the marine ecology receptor, as defined in section 7.5 and section 7.6 of this Scoping Report.
- 7.3.3 Data sources

Airborne noise

- 7.3.3.1 It is proposed to carry out baseline noise monitoring at locations representative of the nearest noise sensitive receptors to the Lease Area and offshore export cable routes as part of this study.
- 7.3.3.2 It is proposed to carry out baseline noise monitoring at six locations located between Magherabeg to the north and Kilgorman to the south. The locations are representative of the nearest noise sensitive receptors to the Proposed Development. The proposed monitoring locations are based on a desktop review of the area and it may be necessary to amend some of the proposed monitoring locations once a site visit has been undertaken.
- 7.3.3.3 Survey locations have been chosen to characterise the noise environment in the vicinity of the nearest noise sensitive receptors to the offshore infrastructure.

Underwater noise

- 7.3.3.4 For the purposes of the assessment of underwater noise on the marine environment, there is no requirement to collect baseline data due to the criteria for assessing the impact of anthropogenic sound on the marine environment.
- 7.3.3.5 In order to gain an understanding of the baseline underwater noise environment, it is proposed to use noise measurements from nearby and other acoustically similar sites as a proxy for the Arklow Bank area. It is also proposed to review noise data relating to other offshore sites and assess their suitability for application to Arklow Bank.
- 7.3.3.6 Underwater noise source data will be taken from a combination of publicly available noise data for other similar developments, relevant standards, empirical calculations and theoretical predictions. Specific underwater noise measurement data for the combinations of pile diameters and hammer energies is rarely available, and these data are frequently recorded in formats which cannot be compared against the impact criteria. Consequently, when using measured data, it is often necessary to apply empirical correction to convert from, for example, Root Mean Square (rms) sound pressure levels to Sound Exposure Level (SEL) or peak pressure levels. Due to the general lack of empirical data, this is not considered a robust approach, and therefore the approach described above is proposed.

7.3.4 Baseline environment

Airborne noise

7.3.4.1 The baseline environment will be established following completion of the baseline noise monitoring discussed above.

Underwater noise

- 7.3.4.2 Background or "ambient" underwater noise is generated by a number of natural sources, such as rain, breaking waves, wind at the surface, seismic noise, biological noise and thermal noise. Biological sources include marine mammals (which use sound to communicate, build up an image of their environment and detect prey and predators) as well as certain fish and shrimp. Anthropogenic sources also add to the background noise, such as fishing boats, ships, industrial noise, seismic surveys and leisure activities.
- 7.3.4.3 The vast majority of research relating to both physiological effects and behavioural disturbance due to noise on marine species is based on determining the absolute noise level for the onset of that effect. As a result, criteria for assessing the effects of noise on marine mammals and fish tend to be based on the absolute noise criteria, as opposed to the difference between the baseline noise level and the specific noise being assessed. It is important to understand that baseline noise levels will vary significantly depending on, amongst other factors, seasonal variations and different sea states, meaning that the usefulness of establishing such a value would be very limited. Nevertheless, it can be useful (though not essential) when undertaking an appraisal of underwater noise to have an understanding of the range of noise levels likely to be prevailing in the area so that any noise predictions can be placed in the context of the baseline. It is important to note, however, that even if an accurate baseline noise level could be determined, there is a paucity of scientific understanding regarding how various species distinguish anthropogenic sound relative to masking noise. An animal's perception of sound is likely to depend on numerous factors including the hearing integration time, the character of the sound and hearing sensitivity. Therefore, it is necessary to exercise considerable caution if attempting any comparison between noise from the Proposed Development and the baseline noise level.
- 7.3.5 Potential impacts

Airborne noise

7.3.5.1 Table 7.3 presents the potential impacts that could arise from the Proposed Development during the construction, operational and maintenance and decommissioning phases.

Table 7.3: Impacts to be scoped in for the Airborne Noise EIAR chapter.

Potential impact	Pha	ase		Justification	
	СО		D		
Increases in airborne noise due to impact piling, construction vessels and cable installation activities	•	×	•	 Construction phase There is potential for airborne noise impacts at onshore noise sensitive receptors (NSR) in Arklow town and the surrounding areas due to impact piling of wind turbine and OSP foundations, construction vessels and cable installation activities. Decommissioning phase Decommissioning effects associated with the removal of offshore 	
				Infrastructure are envisaged to the same or similar to those described for the construction phase, but with the exception that piling operations will not be required.	
The effects of airborne	×	~	×	Operational and maintenance phase	
noise generated by the operational wind turbines				• It is unlikely that there will be airborne noise effects from the operational wind turbines on onshore NSR due to distance between the receptors	

Potential impact	Ph	ase		Justification	
	С	0	D		
				and the Lease Area (i.e. 6 to 13 km). However, noise modelling will be undertaken the EIAR to understand this impact further.	

Underwater noise

- 7.3.5.2 During construction, there is potential for underwater noise impacts on sensitive ecological receptors due to impact piling, construction vessels and cable installation activities. During operation, there is potential for underwater noise impacts on sensitive ecological receptors due to operational wind turbines and maintenance activities. Decommissioning effects associated with the removal of offshore infrastructure are envisaged to the same or similar to those described for the construction phase, but with the exception that piling operations will not be required. The potential impacts on these receptors will be assessed within the relevant technical chapters of the EIAR.
- 7.3.6 Impacts scoped out of further assessment
- 7.3.6.1 No impacts are scoped out of the Airborne Noise EIAR chapter.
- 7.3.6.2 Any potential impacts from underwater noise to be scoped out will be outlined within the relevant technical chapters of the EIAR.
- 7.3.7 Proposed assessment methodology

Airborne noise

- 7.3.7.1 The assessment of airborne noise effects on onshore NSR from the construction phase will assume a maximum design scenario which leads to the greatest noise levels over the longest duration. Source noise data for offshore piling will be derived from a review of published measurements on pile driving hammers and, where necessary, scaled up for the appropriate pile size and hammer energy. Likewise, source noise levels for typical construction vessels, including the cable lay vessels, will be derived from published noise data. Sound propagation modelling will utilise a suitable peer reviewed methodology such as Nord2000 which takes into account refraction under a number of commonly occurring meteorological conditions. The modelling will be carried out using typical meteorological conditions and assume downwind propagation (i.e. worst-case).
- 7.3.7.2 The approach to the construction phase airborne noise assessment will be carried out in accordance with BS 5228-1:2009+A1:2014 "*Code of practice for noise and vibration control on construction and open sites*". Mitigation measures will be formulated as part of the assessment.
- 7.3.7.3 The assessment of airborne noise effects on onshore NSR from the operation of the Proposed Development will assume the maximum design scenario of the wind speed resulting in the highest noise level, according to the manufacturer's data, for the loudest turbine option. The scenario will include all turbines operating simultaneously and be assessed at the closed residential receptor. Sound propagation modelling will utilise a suitable peer reviewed methodology such as Nord2000 which takes into account refraction under a number of commonly occurring meteorological conditions.
- 7.3.7.4 There is no definitive guidance for the assessment of noise impacts from offshore wind farms. The assessment will therefore take account of WHO guidance contained within the Night Noise Guidelines for Europe, The Assessment and Rating of Noise from Wind Farms: The Working Group on Noise from Wind Turbines (Report ETSU-R-97), 1996 and the Institute of Acoustics Good Practice Guide to the assessment and rating of wind turbine noise (2013).

Underwater noise

- 7.3.7.5 The impact criteria to be adopted for the Proposed Development will be based on the latest scientific research and guidance and will be based on a precautionary approach. Impacts on marine mammals and fish will be assessed with respect to the potential for injury and behavioural disturbance. Impact criteria will be based on those set out in National Marine Fisheries Service (NMFS) (2018) *"Technical guidance for assessing the effects of anthropogenic sound on marine mammal hearing: Underwater acoustic thresholds for onset of permanent and temporary threshold shifts"*; Southall *et al.*, (2019) *"Marine mammal noise exposure criteria: Updated scientific recommendations for residual hearing effects"*; and Popper *et al.* (2014) *"Sound exposure guidelines for Fishes and Sea Turtles"*. Mitigation measures will be formulated and assessed as part of the study.
- 7.3.7.6 Noise source data will be based on measured data from similar wind turbine devices wherever possible. If no data exists, source noise levels will be based on a combination of theoretical and empirical predictions and scaling of existing data where applicable. Source levels for other types of noise associated with the Proposed Development (e.g. piling, vessels, installation and decommissioning activities) will be based on published data and established prediction methodologies.
- 7.3.7.7 Underwater noise modelling will be undertaken to assess the impact of construction and operational noise using a robust, peer reviewed sound propagation model (Weston, 1971). This will take into account the bathymetry and other characteristics of the area, including the geo-acoustic properties of the seabed. The modelling will also take into account the swim speeds of marine mammals and fish to calculate cumulative sound exposure levels.
- 7.3.7.8 The results of the study will be presented in the Subsea Noise Technical Report, which will be used to inform the Fish, Shellfish and Sea Turtle Ecology and Marine Mammal EIAR chapters.

7.3.8 Designed-in measures and mitigation

- 7.3.8.1 Measures adopted as part of the Proposed Development in relation to subsea noise are discussed within section 7.5 and section 7.6 with respect to the environmental receptor.
- 7.3.8.2 Any further mitigation requirements to be adopted for airborne noise and subsea noise will be dependent on the significance of the effects.

7.4 Benthic subtidal and intertidal ecology

7.4.1.1 This EIAR chapter will consider the potential impacts of the Proposed Development on benthic subtidal and intertidal ecology during the construction, operational and maintenance and decommissioning phases.

7.4.2 Study area

7.4.2.1 For the purposes of the benthic subtidal and intertidal ecology assessments, the Benthic Subtidal and Intertidal Ecology Study Area is defined as the area encompassing the Lease Area, the offshore export cable routes and the Northern Landfall location, and the surrounding area (delineated as one tidal excursion (see section 7.2) from the Foreshore Lease Area (i.e. the maximum extent to which impacts could occur). To provide a wider context, the desktop review will also consider the benthic subtidal and intertidal habitats, communities and species present within the wider southwest Irish Sea (i.e. Regional Benthic Ecology Study Area).

7.4.3 Data sources

Subtidal ecology

7.4.3.1 Desktop data sources include academic reports, consent applications, and surveys to support the designation of SACs for offshore sand banks located to the south of Arklow Bank. Specifically, these will include:

- EMODnet broad-scale seabed habitat map for Europe (EUSeaMap);
- Biological data collected through the Habitat Mapping for Conservation and Management of the Southern Irish Sea (HABMAP), Benthic Biodiversity in the Southern Irish Sea Project (BIOMOR) and South West Irish Sea Survey (SWISS) projects (reported in Robinson *et al.*, 2012);
- Diversity of demersal and megafaunal assemblages inhabiting sandbanks of the Irish Sea (Atalah *et al.,* 2013);
- Littoral and Benthic Investigations on the South Coast of Ireland: II. The Macrobenthic Fauna of Carnsore Point (Keegan *et al.*, 1987); and
- Aqua-fact International Services Ltd (2008) Proposed Dredge Disposal Sites for Arklow
 Harbour Commissioner. Available online:
 http://www.epa.ie/licences/lic_eDMS/090151b28037c91c.pdf [Accessed 27 November 2018].
- 7.4.3.2 A number of benthic subtidal ecology surveys have been conducted across the Lease Area and offshore export cable routes between 2000 and 2011. These include pre-construction baseline surveys undertaken in 2000 for ABWP Phase 1 and a series of post-construction monitoring surveys undertaken over a period of eight years (2004 to 2011, inclusive) for ABWP Phase 1. Site-specific geophysical surveys were also undertaken across the Lease Area and offshore export cable routes in 2019 and these data will be used to further inform the baseline characterisation, alongside the ecological datasets. All site-specific data sources are summarised in Table 7.4 below and while the sampling methods were not identical across all surveys, these datasets provide a robust characterisation of the benthic subtidal ecology assemblages across the Benthic Subtidal and Intertidal Ecology Study Area for the purposes of the EIAR.

Table 7.4: Summary of site-specific benthic subtidal ecology surveys of the Arklow Bank Wind Park.

Data source	Date(s) of survey	Survey methodology	
	June 2000	Anchor dredge with large net mesh (infauna) – 21 stations Intertidal (littoral) survey of landfalls.	
EcoServe (2001b). Baseline/pre-construction	September 2000	Anchor dredge with large net mesh (infauna) – 19 stations	
Suvey.		Otter trawl (fish and epifauna) – 6 stations	
	April 2001	Anchor dredge with large net mesh (infauna) – 15 stations	
		Agassiz trawl (fish and epifauna) – 3 stations	
HydroServ Projects Ltd. (2004). Post-	June/July 2004	Day grabs (infauna)	
construction survey.	•	Beam trawls (epifauna)	
HydroServ Projects Ltd (2005). Post- construction survey.	October 2004	_	
HydroServ Projects Ltd (2006a). Post- construction survey.	June 2005	- Anchor dredge with closed metal base (infauna)	
HydroServ Projects Ltd (2006b). Post- construction survey.	November 2005		
HydroServ Projects Ltd (2007a). Post- construction survey.	June 2006	Beam trawls (epifauna)	
HydroServ Projects Ltd (2007b). Post- construction survey.	May 2007	-	
HydroServ Projects Ltd (2009). Post- construction survey.	May 2008		

Data source	Date(s) of survey	Survey methodology
Arklow Energy Ltd (2010). Post-construction survey.	June, 2009	
GE Wind Energy (2011). Post-construction survey.	June 2010	_
GE Wind Energy (2012). Post-construction survey.	June 2011	
Aqua-fact International Services Ltd (2008) Proposed Dredge Disposal Sites for Arklow Harbour Commissioner	June 2007	Divers using corers for benthic fauna, particle size analysis and organic carbon.
Atalah <i>et al.</i> , 2013. Diversity of demersal and megafaunal assemblages inhabiting sandbanks of the Irish Sea	August 2007	Beam trawls (demersal fish and megafaunal invertebrates)
Aquatic Services Unit (2016). Sediment chemistry sampling to support dredge application.	May 2016	Van Veen grabs for sediment chemistry.
Site-specific geophysical surveys of the Lease Area and offshore export cable routes.	July/August 2019	Multibeam echo sounder, side-scan sonar, sub- bottom profiler and magnetometer sampling.
Intertidal walkover survey	June 2019	Phase 1 ⁵ habitat intertidal walkover of the proposed landfall site including site dig-over sediment sampling.

7.4.3.3 Further benthic subtidal surveys are not proposed to characterise the benthic subtidal ecology baseline for the purposes of undertaking the EIA. This is on the basis that benthic subtidal ecology within the Benthic Subtidal and Intertidal Ecology Study Area has been very well characterised by numerous surveys between 2000 and 2011, all of which have demonstrated consistency in the infaunal and epifaunal communities present across the survey area. Furthermore, the results of these surveys are consistent with the findings of published desktop data sources for this part of the Irish Sea. In addition, site-specific geophysical data collected in 2019 have confirmed that the sediments characterising the Lease Area and offshore export cable routes are comprised of sandy sediments, with coarser sediments to the west of Arklow Bank. These observations align with the patterns recorded in the site-specific benthic ecology surveys undertaken between 2000 and 2011, further demonstrating the consistency in the seabed sediment types/sediment and communities associated with them.

Intertidal ecology

7.4.3.4 The site-specific Phase 1⁶ habitat intertidal walkover surveys of both offshore export cable landfalls carried out in 2019 (Table 7.4) provide a robust characterisation of the intertidal communities present for the purposes of the EIAR. Some areas of the intertidal survey area were found to be inaccessible, with a small number of coves cut off by the sea and surrounding outcrops/cliffs and therefore not accessible on foot. However, sampling at adjacent areas of shore and observations of inaccessible areas from adjacent clifftops provide a robust characterisation of these areas as the inaccessible coves were observed to be comprised of identical sediments (i.e. coarse sands, gravels and shell hash) and subject to identical environmental conditions (i.e. wave exposed beaches with only a small tidal range) as the areas where walkover survey and on site dig-over sampling was possible.

⁶ A Phase 1 habitat survey is a system for classifying and mapping habitats and is the industry standard used by ecologists throughout Ireland and the UK.

7.4.4 Baseline environment

Subtidal ecology

- 7.4.4.1 The seabed of the western Irish Sea comprises current swept coarse sediments which consist of compact sand, with gravel, shell and/or cobbles in varying proportions. The European Marine Observation and Data Network (EMODnet) broad-scale seabed habitat map for Europe (EUSeaMap) presents the European Nature Information System (EUNIS) habitat classifications for the southern Irish Sea. Seabed habitat information is also available through the habitats theme accessed through Ireland's Marine Atlas (Ireland's Marine Atlas, 2016). Circalittoral fine sand or circalittoral muddy sands are predicted in association with Arklow Bank itself and circalittoral/deep circalittoral coarse sediment in the areas to the east and inshore to the west. The most inshore waters near Arklow town are predicted to be a combination of circalittoral fine sand or circalittoral muddy sand and, to a lesser extent, circalittoral sandy mud.
- 7.4.4.2 The infaunal communities associated with the soft-sediment communities of the western Irish Sea are described in Keegan *et al.* (1987) as being typically impoverished, which is reflective of the mobile nature of the sediments in this area as a result of exposure to strong currents and weather-induced turbulence. The epifaunal communities are characterised in Keegan *et al.* (1987) by erect hydroids (typically *Hydrallmania falcata, Sertularia argentea, Nemertesia spp.*) that attach to cobbles or shells with the bryozoan *Flustra foliacea* abundant on bedrock exposed to strong currents and scour. Other habitats in this region include banks of cobbles and coarse sands characterised by the polychaetes *Nephtys cirrosa*, *Ophelia borealis* and *Lanice conchilega*, and bivalves *Spisula elliptica* and *Abra alba* (Keegan *et al.*, 1987).
- 7.4.4.3 More recently, Robinson *et al.* (2012), using a combination of Habitat Mapping for Conservation and Management of the Southern Irish Sea (HABMAP), Benthic Biodiversity in the Southern Irish Sea Project (BIOMOR) and South West Irish Sea Survey (SWISS) project data, identified that the benthic infaunal communities associated with areas of sandy and gravelly waves off the coast at Arklow resemble the "*Moerella spp*. with venerid bivalves in infralittoral gravelly sand" biotope as described in Connor *et al.* (2004). Species-rich gravelly plains were recorded throughout St George's Channel and were generally classified as the '*Mediomastus fragilis, Lumbrineris spp.*, and venerid bivalves in circalittoral coarse sand or gravel' biotope.
- 7.4.4.4 The results of the site-specific surveys showed that the seabed was predominately sedimentary with little or no fixed hard substrata. The Arklow Bank itself was found to consist of sand and shell with pebbles at the northern end with fine clean sand at the southern end. To the west, north and south of the bank, the seabed ranged from sandy shell and gravel, and to the east, coarse shell and gravel characterised the seabed. Some large boulders and rocks were recorded in the area to the east of the bank. Inshore, the seabed was sandy with some mud content. These patterns in sediment composition have recently (2019) been validated via the site-specific geophysical survey (see Table 7.4), which confirmed that the Arklow Bank was dominated by sandy sediments, with mobile seabed features including sand ribbons and sand waves also recorded (see Figure 7.5 and Figure 7.6). Interpretation of the geophysical data also confirmed that the offshore export cable routes were characterised by a mix of mobile sandy sediments and areas of coarse sediment (i.e. sand and gravels; see Figure 7.6).
- 7.4.4.5 Site-specific survey data indicated that species diversity was highest with areas of sandy shell, gravel and cobbles in the northwest, southwest and southeast of the bank and inshore along the offshore export cable routes. The communities at locations characterised by large amounts of gravel (i.e. to the east and northwest of the bank), returned large numbers of epifaunal invertebrates such as the tubeworms *Pomatoceros triqueter*, *P. larmarckii* and *Hydroides norvegica*, the tunicate *Dendrodoa grossularia*, barnacles *Balanus crenatus* and *Verruca stroemia*, the chiton *Leptochiton asellus* and the colony forming tubeworms *Sabellaria spinulosa* and *S. alveolata*. The communities associated with sandy sediments were extremely species poor in comparison, as would be expected for mobile sandy sediments characterising a shallow sandbank.

- 7.4.4.6 During the site-specific surveys, a total of nine biotopes were identified across the survey area, all common to the east coast of Ireland. The Infralittoral mobile clean sand with sparse fauna (SS.SSa.IFiSa.IMoSa) biotope was recorded in association with the sandy/shell sediments of the Arklow Bank feature and also throughout the inshore area to the south of the offshore export cable routes. The inshore area through which the offshore export cable routes extend were characterised by the '*Flustra foliacea* on slightly scoured silty circalittoral rock' (CR.MCR.EcCr.FaAICr.Flu) biotope, with the muddy sands associated with the inshore area in the vicinity of the town of Arklow characterised by the 'Infralittoral muddy sand' (SS.SSa.IMuSa) biotope. The *Sertularia cupressina* and *Hydrallmania falcata* on tide-swept sublittoral sand with cobbles or pebbles' (SS.SSa.IFiSa.ScupHyd) biotope was recorded in the areas immediately to the east and west of the bank.
- 7.4.4.7 During the site-specific surveys no rare or uncommon species were recorded within the survey area although both S. alveolata and S. spinulosa were recorded subtidally to the northwest and the east of the bank (likely to be the S. spinulosa on stable circalittoral mixed sediment (SS.SBR.PoR.SspiMx), due to the prevalence of sand and gravelly sediments in the region). Species richness was found to be greatest at locations where Sabellaria spp. were recorded. There was some variability in the distribution and abundances of Sabellaria spp. across the survey area between the various pre-construction and post-construction surveys, with up to ten sites recording this species in 2005, but subsequent surveys showed a lower number of sites where Sabellaria spp. was recorded (three sites in 2004 and 2009, two sites in 2006 and one site in 2007). Sabellaria is a reef forming species, with reefs known to be naturally ephemeral habitats and the patchy and variable nature of its distribution and abundance within the site-specific surveys reflects this variability. While the locations where Sabellaria spp. were recorded were not assessed for their reef potential (e.g. using best practice guidelines set out in e.g. Limpenny et al., 2010; Gubbay, 2007), records of this species were most consistently made at the northern end of the survey area (to the northwest of Arklow Bank and to the north of the northernmost offshore export cable route) and to the east of Arklow Bank; no areas of Sabellaria spp. have been recorded on Arklow Bank itself.



Figure 7.6: Geophysical seabed interpretation, including seabed features.

Intertidal ecology

- 7.4.4.8 Site-specific intertidal data for the Northern Landfall, south of Ennereilly Beach, were presented in the 2001 EIS from an intertidal survey undertaken in 2001. The upper shore comprised very coarse sand with oyster shells, and no obvious fauna or flora. The mid-shore comprised fine and coarse mobile sand with gravel and cobbles, characterised by amphipods (*Talitridae*), mussels and oyster shells. Along the lower shore, the sediment consisted of coarse gravelly sand with amphipods (*Talitridae*). Patches of bedrock on the lower shore supported a faunal mosaic of mussel *Mytilus edulis*, limpet *Patella vulgata* and sparse barnacle species, with a floral community of green algae *Enteromorpha sp.* and kelp *Laminaria sp.* No rare species or species of conservation importance were recorded.
- 7.4.4.9 In 2019, a Phase 1⁷ habitat intertidal walkover survey was undertaken at the proposed landfall location south of Ennereilly Beach to provide a robust and up-to-date baseline characterisation of the intertidal ecology for the purposes of the EIAR. Surveys were undertaken in June 2019, following best practice guidance outlined in Davies *et al.* (2001) and Wyn *et al.* (2006), while habitats/biotopes were classified in accordance with Connor *et al.* (2004).
- 7.4.4.10 The Northern Landfall consists of a very narrow intertidal area with cliff outcrops of between 1 m and 20 m in height and vegetated slopes above the tide line. Periodically the cliff outcrops extend below the Low Water Mark (LWM) to create a series of small inlets. The shore in these inlets is gently sloping to steep soft sediment down to LWM. Some of these inlets were inaccessible. However, visual observations made during the survey suggest that these sediments are broadly similar. Generally, the intertidal habitats at the Northern Landfall were consistent with those observed in 2001, being characterised by mobile pebbles, coarse to fine sands, with the upper shore comprised of coarse sand, cobble and relict native oyster *Ostrea edulis* shell hash. Replicate dig-over samples were carried out at a number of points in the intertidal and all recorded no fauna, confirming that the sediments are impoverished, with the most appropriate biotopes classifications being Barren littoral shingle (LS.LCS.Sh.BarSh) and Barren littoral coarse sand (LS.LSa.MoSa.BarSa).
- 7.4.4.11 The lower reaches of the cliff outcrops to the north and south of the beach supported low numbers of encrusting barnacles and limpets (*Patella vulgata*) and conform to the biotope classification LR.HLR.MusB.Sem.Sem (*Semibalanus balanoides*, *P. vulgata* and *Littorina spp.* on exposed to moderately exposed or vertical sheltered eulittoral rock).
- 7.4.4.12 No rare or uncommon species, or species or habitats of conservation importance were recorded at the landfall.

⁷ A Phase 1 habitat survey is a system for classifying and mapping habitats and is the industry standard used by ecologists throughout Ireland and the UK.



Figure 7.7: European sites in proximity to the Proposed Development.

Designated sites

7.4.4.13 No sites of nature conservation importance for benthic subtidal or intertidal ecology overlap with the Lease Area or offshore export cable routes (see Figure 7.7). The nearest Natura 2000 sites with relevant benthic ecology features are the Wicklow Reef SAC designated for the Annex I habitat 'Reefs' (approximately 5 km to the north of the Lease Area) and the Blackwater Bank SAC (approximately 15 km to the south of the Lease Area) designated for the presence of the Annex I habitat 'Sandbanks which are slightly covered by sea water all the time'.

7.4.5 Potential impacts

7.4.5.1 Table 7.5 presents the potential impacts on benthic subtidal and intertidal ecology that could arise from the Proposed Development during the construction, operational and maintenance and decommissioning phases of the Proposed Development.

Table 7.5: Impacts to be scoped in for the Benthic Subtidal and Intertidal Ecology EIAR chapter.

Potential	Ph	ase		Justification		
impact	С	0	D			
Temporary	✓	✓	✓	Construction and decommissioning phases		
subtidal habitat loss/disturbance				• There is potential for temporary, direct habitat loss and disturbance to benthic subtidal habitats as a result of site preparation activities in advance of installation of wind turbines and OSP foundations, cable installation activities (including pre-cabling seabed clearance, HDD and anchor placements), and placement of spud-can legs from jack-up operations, and as a result of decommissioning activities		
				Operational and maintenance phase		
				• Temporary habitat loss/disturbance may occur during the operational and maintenance phase of the Proposed Development as a result of maintenance operations (e.g. cable repair/reburial, use of jack-up vessels to facilitate wind turbine component repairs etc.). The impacts associated with these operations are likely to be similar in nature to those associated with the construction phase although of reduced magnitude.		
Increased	✓	√	√	All phases		
suspended sediment concentrations and associated deposition				• Sediment disturbance arising from construction activities (e.g. foundation installation (wind turbine and OSP) and cable installation (including HDD)) and decommissioning activities may result in indirect impacts on benthic communities as a result of temporary increases in suspended sediment concentrations (SSCs) and associated sediment deposition (i.e. smothering effects). Sediment disturbance could also occur during operational and maintenance if cable repairs are required.		
Long-term	~	×	✓	Construction and decommissioning phases		
subtidal habitat loss				 There is the potential for long-term habitat loss to occur directly under all foundation structures and associated scour protection, and under any cable protection required along the inter-array and offshore export cable routes. 		
Colonisation of	×	~	×	Construction and decommissioning phases		
hard structures				 Artificial structures placed on the seabed (i.e. foundations and scour/cable protection) in the offshore environment are expected to be colonised by a range of marine organisms leading to localised increases in biodiversity. These structures may also facilitate the spread of marine invasive and non-native species. 		
Alteration of	×	✓	×	Construction and decommissioning phases		
seabed habitats arising from effects on physical processes				• The presence of foundation structures, associated scour protection and cable protection may introduce localised changes to the tidal flow and wave climate, resulting in potential changes to the sediment transport pathways and associated effects on benthic ecology. Some benthic species and communities may be more vulnerable to reductions in water flow if the decrease is sufficient to reduce the availability of suspended food particles,		

Potential P		Phase		Justification		
impact	С	0	D			
				and consequently inhibit feeding and growth. Scour and increases in flow rates can change the characteristics of the sediment potentially making the habitat less suitable for certain species.		
Removal of hard	×	×	1	Decommissioning phase		
substrates resulting in loss of colonising communities				 The removal of foundations and any scour/cable protection during decommissioning has the potential to lead to loss of species/habitats colonising these structures. 		
Increased risk of	✓	✓	1	Construction phase		
introduction and spread of invasive and non-native				There is potential for increased risk of invasive and non-indigenous species (INIS) due to requirement for vessel round trips during the construction phase.		
species				Operational and maintenance phase		
				There is potential for increased risk of INIS due to the long-term creation of hard substrates due to foundations, associated scour protection and cable protection; and requirement for vessel round trips per year during the operational and maintenance phase.		
				Decommissioning phase		
				• There is potential for increased risk of INIS due to requirement for vessel round trips during the decommissioning phase.		
Accidental	✓	✓	~	All phases		
pollution				• There is a risk of pollution being accidentally released during the construction, operational and maintenance and decommissioning phases from sources including vessels/vehicles and equipment/machinery.		

7.4.6 Impacts scoped out of further assessment

7.4.6.1 Table 7.6 presents the potential impacts to be scoped out of the Benthic Subtidal and Intertidal Ecology EIAR chapter.

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Potential impact	Justification
Temporary and long-term intertidal habitat loss/disturbance	 Offshore export cables will be installed via Horizontal Directional Drilling (HDD). This is a process whereby the offshore export cables are installed beneath the cliff, avoiding any direct impacts on intertidal habitats. A transition pit will be excavated on the landward side of the cliff, from which a borehole will be drilled underneath the cliff and the intertidal. Given the narrow intertidal zone, the drill exit point will be below the Low Water Mark. Once the bore is drilled, cable ducts and offshore export cables will be installed beneath the cliff. As such, there will be no direct impact on intertidal habitats, with any direct effects of HDD operations limited to either the terrestrial or subtidal environments. As such it is proposed that temporary and long-term habitat loss effects on intertidal habitats are scoped out of the EIAR.
	 Other indirect effects on intertidal habitats, e.g. increases in suspended sediments, will remain scoped into the EIAR.
Remobilisation of contaminated sediments	 Seabed disturbance associated with construction, maintenance and decommissioning activities (e.g. foundation and cable installation) could lead to the remobilisation of sediment-bound contaminants that may result in harmful and adverse effects on benthic communities. Recent sampling undertaken in support of a permit application to undertake dredging and disposal works for ABWP Phase 1 (Ramboll, 2016) has demonstrated that contamination in the offshore sediments is low and at levels which are unlikely to result in adverse effects on benthic communities. Furthermore, the coarse nature of the

Potential impact	Justification
	sediments on site (i.e. sand and gravels with minimal proportion of fines) means that significant contamination is unlikely to be present in sediments (contaminants such as metals and hydrocarbons are typically bound to fine sediments such as mud). Therefore, it is considered unlikely that there would be any pathways for an impact on benthic communities. It is therefore proposed to scope this impact out of further consideration within the EIAR.

7.4.7 **Proposed assessment methodology**

- 7.4.7.1 The EIAR will consider the potential impacts of the construction, operational and maintenance and decommissioning phases of the Proposed Development within the Benthic Subtidal and Intertidal Ecology Study Area. The EIA methodology will consider the most recent Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment in the UK and Ireland (2019) and EPA (2017) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.
- 7.4.7.2 For the purposes of undertaking the EIAR, marine habitats and species identified as having the potential to occur in the Benthic Subtidal and Intertidal Ecology Study Area will be grouped into broad habitat/community types. These broad habitat/community types will serve as the Important Ecological Features (IEFs) against which impacts associated with the construction, operational and maintenance and decommissioning phases of the Proposed Development will be assessed. Habitats with similar physical and biological characteristics (including species complement and richness/diversity) as well as conservation status/interest will be grouped together for the purposes of the EIAR. Consideration will also be given to the inherent sensitivities of different habitats in assigning the groupings, such that habitats and species with similar vulnerability and recoverability, often as a result of similar broad sediment types and species complements, will be grouped together. Impacts on IEFs will be described in terms of the magnitude of that impact and correlated against the sensitivity of each IEF to that each impact, to produce a statement of significance (see section 6.5).
- 7.4.7.3 Information on the sensitivities of benthic ecology receptors will largely be drawn from the Marine Evidence based Sensitivity Assessment (MarESA) (Tyler-Walters *et al.*, 2018). The MarESA is a database which has been developed through the Marine Life Information Network (MarLIN) of Britain and Ireland and is maintained by a number of organisations, including the Marine Biological Association (MBA) and other statutory organisations in the UK. This database comprises a detailed review of available evidence on the effects of pressures on marine species or habitats, and a subsequent scoring of sensitivity against a standard list of pressures, and their benchmark levels of effect.
- 7.4.7.4 The evidence base presented in the MarESA is peer reviewed and represents the largest review undertaken to date on the effects of human activities and natural events on marine species and habitats. It is considered to be one of the best available sources of evidence relating to recovery of benthic species and habitats.
- 7.4.7.5 Further detail of how sensitivity is defined is outlined in Tyler-Walters *et al.* (2018). Sensitivities to the key activities across the Proposed Development lifetime (i.e. construction and operational and maintenance phases) will be summarised according to the MarESA for each of the biotopes within the Benthic Subtidal and Intertidal Ecology Study Area. Where sensitivity information on specific biotopes are not available through the MarESA, suitable proxies will be used.

7.4.8 Designed-in measures and mitigation

- 7.4.8.1 The following designed-in measures are proposed in relation to benthic subtidal and intertidal ecology:
 - Pre-construction Annex I reef survey may be required to determine the location, extent and composition of any *Sabellaria spp*. reefs present, which will inform cable routing to avoid

direct impacts to these features if present. This would apply to the offshore export cable routes only, as *Sabellaria* spp. has not historically been recorded within the Lease Area (i.e. *Sabellaria* spp. do not typically occur on sandbank features); and

- An Environmental Management Plan (EMP) will be developed and implemented to cover the construction and operational and maintenance phases of the Proposed Development. The EMP will include planning for accidental spills, address all potential contaminant releases and include key emergency contact details.
- 7.4.8.2 Any further mitigation requirements for benthic subtidal and intertidal ecology will be dependent on the significance of the effects.

7.5 Fish, shellfish and sea turtle ecology

7.5.1.1 This EIAR chapter will consider the potential impacts of the Proposed Development on fish, shellfish and sea turtle ecology during the construction, operational and maintenance and decommissioning phases.

7.5.1 Study area

7.5.1.1 For the purposes of the EIAR, the Fish, Shellfish and Sea Turtle Ecology Study Area is defined as the area encompassing the Lease Area, the offshore export cable routes and the surrounding area (delineated as one tidal excursion from the Foreshore Lease Area). To provide a wider context, the desktop review will also consider the fish, shellfish and sea turtle habitats, communities and species present within the wider western Irish Sea (i.e. Western Irish Sea Fish, Shellfish and Sea Turtle Study Area). The study areas are illustrated in Figure 7.8.



Document Name: EOR0765_SCO_017_01_ExtentFishShellfishandSeaTurtle_200917

Figure 7.8: Fish, Shellfish and Sea Turtle Ecology Study Area and Western Irish Sea Fish, Shellfish and Sea Turtle Study Area and sites designated for the protection of Annex II fish species.

7.5.2 Data sources

Desktop data

7.5.2.1 Information on fish and shellfish ecology within the western Irish Sea and specifically across the Arklow Bank will be collated through a detailed desktop review of existing studies and datasets. Key organisations including National Parks and Wildlife Service (NPWS) and Inland Fisheries Ireland (IFI) will be contacted to obtain relevant data sources. Desktop data sources include academic reports, consent applications, and surveys to support the designation of SACs for Annex II fish species. Examples of key data sources are listed in Table 7.7, noting that this list is not exhaustive.

Table 7.7: Examples of key desktop sources to inform the fish, shellfish and sea turtle ecology baseline.

Title	Description	Source
Celtic Sea Trout Project (CTSP)	Status, distribution, genetics and ecology of sea trout populations in the Irish Sea	CSTP (2016)
Celtic Seas ecoregion fisheries overview	Summary of commercial fisheries in the Celtic Sea	ICES (2018)
National Programme: Habitats Directive and Red Data Book Fish Species	Summary reports of monitoring undertaken by Inland Fisheries Ireland (IFI) in relation to threatened fish species (e.g. lamprey, shad)	Gallagher <i>et al</i> . (2016)
Ireland Red List (No. 11 and No. 5)	Red list of cartilaginous fish species for Ireland Red List of Amphibians, Reptiles and Freshwater Fish	Clarke <i>et al.</i> (2016) King <i>et al.</i> (2011)
National Parks and Wildlife Service protected sites	Online resources showing location and citation features of protected areas around the coast of Ireland	https://www.npws.ie/protected- sites
Biodiversity maps	National portal that compiles biodiversity data from multiple sources	https://maps.biodiversityireland.ie/#
ICES Division VIIa technical reports series	Various scientific reports on fish and shellfish ecology from surveys undertaken in the Irish Sea	Cefas (<u>https://www.cefas.co.uk/cefas-</u> <u>data-hub/</u>)
Diversity of demersal and megafaunal assemblages inhabiting sandbanks of the Irish Sea	Analyses of demersal communities at three sandbanks in the Irish Sea, including the Arklow sandbank, Blackwater Bank (south of Arklow) and Kish Bank (north of Arklow)	Atalah <i>et al.</i> (2013)
Fisheries Sensitivity Maps in British Waters	Spawning and nursery areas for key fish species including within the Irish Sea	Coull <i>et al.</i> (1998)
Spawning and nursery grounds of selected fish species in UK Waters	Spawning and nursery areas for key fish species including within the Irish Sea	Ellis <i>et al.</i> (2012)
An Inventory of Irish Herring Spawning Grounds	Herring spawning grounds around the coast of Ireland	O'Sullivan <i>et al.</i> (2013)
Slaney River Valley SAC. Site Synopsis (Site Code: 000781)	SAC site selection details	Department of Arts, Heritage and the Gaeltacht (DAHG) (2015)

Site-specific surveys

7.5.2.2 Site-specific surveys carried out to inform the pre-construction baseline and as part of postconstruction monitoring for ABWP Phase 1 will also be drawn upon to characterise the fish and shellfish community. These data sources are summarised in Table 7.4 in section 7.4. 7.5.2.3 Further published information, particularly in relation to inshore fish and shellfish resources, will be sought from appropriate sources such as the NPWS, IFI and the Marine Institute, to inform the EIAR.

7.5.3 Baseline environment

- 7.5.3.1 The seabed in the western Irish Sea is characterised largely by coarse sediment whilst circalittoral fine sands are associated with the Arklow Bank itself, grading to sandy shell and cobble/gravel in the margins of the Arklow Bank (see section 7.2). Inshore, along the offshore export cable routes, the substrate grades to finer sands and mud. The substrate is an important environmental variable in determining the composition and abundance of fish and shellfish communities in the region.
- 7.5.3.2 Fine substrates in inshore waters of the western Irish Sea are typically dominated by flatfish including plaice *Pleuronectes platessa*, dab *Limanda limanda* and common sole *Solea solea* (Ellis *et al.*, 2000). In coarse substrates further offshore abundant species include common hermit crabs *Pagurus prideaux* and thickback sole *Microchirus variegatus* whilst muddy sediments are characterised by Norway lobster (*Nephrops norvegicus*) *Nephrops norvegicus* and witch *Glyptocephalus cynoglossus* (Ellis *et al.*, 2000). Atlantic cod *Gadus morhua*, Atlantic herring *Clupea harengus*, European hake *Merluccius merluccius*, whiting *Merlangius merlangus*, blue whiting *Micromesistius poutassou* and horse mackerel *Scomber scombrus* are predominantly found in deeper waters in the benthopelagic or pelagic zone and have been observed throughout the Irish Sea. Their core range includes St Georges Channel (at the southern boundary of the Irish Sea, just south of Arklow Bank), however, they are present around the south and west coast of Ireland and north coast of Northern Ireland.
- 7.5.3.3 The fish and shellfish community in the Lease Area are characteristic of demersal coastal communities of sandbank habitat. A published study on the demersal communities at three offshore sandbanks in the western Irish Sea included the Arklow Bank Wind Park site as one of the study areas (Atalah *et al.*, 2013). Characterising species in the fish and shellfish communities within Arklow Bank included common hermit crab, spotted ray *Raja montagui*, lesser spotted dogfish *Scyliorhinus 55mbricate* and flying crab *Liocarcinus holsatus*. High numbers of juvenile flatfish and elasmobranchs were reported on all the sandbanks, including juvenile spotted ray, plaice and dab, suggesting the use of these sandbanks as nursery areas. The waters off the coast of County Wicklow are reportedly an important pupping/nursery area for elasmobranch species and over the last 10 years the area has become favoured by recreational anglers, targeting mainly elasmobranch species (Roche, W (Inland Fisheries Ireland), pers. comm., 24 January 2019). Of the species that may occur within the Fish, Shellfish and Sea Turtle Study Area, spurdog *Squalus acanthias* is listed as Endangered whilst cuckoo ray *Raja naevus* is listed as Vulnerable on the IUCN (International Union for Conservation of Nature) Red List for Ireland (Clarke *et al.*, 2016).
- 7.5.3.4 Otter trawls were carried out in June 2000 to provide site-specific benthic data for the Lease Area and offshore export cable routes (Ecological Consultancy Services Ltd, 2001). Key fish species noted within the Lease Area were typical of the wider region. Abundant species included poor cod *Trisopterus minutus*, pogge *Agonus cataphractus* and dragonet *Callionymus lyra*. Other commonly recorded species included monkfish *Lophius piscatorius*, thornback ray, cuckoo ray, dogfish *Scyliorhinus flesus*, flounder *Platichthys flesus*, and plaice. Additional site-specific data on fish communities were available from the post-construction benthic monitoring programme for ABWP Phase 1; sampling was undertaken around the ABWP Phase 1 site and inshore along the offshore export cable route, using both a beam trawl and an anchor dredge between 2004 and 2009 (Aquatic Services Ltd., 2010). Plaice, turbot, whiting, dogfish, common sole *Solea solea*, dragonet, pogge, lesser weaver *Echiichthys vipera*, butterfish *Pholis gunnellus*, black scorpionfish *Scorpaena porcus*, sand goby *Pomatoschistus minutus* and black goby *Gobius niger* were included in the list of fish species noted from the trawls.

- 7.5.3.5 Arklow Bank and the surrounding waters also supports a diverse shellfish community, some of which are commercially exploited. Common whelk Buccinum undatum is the most commercially important shellfish, with Arklow Harbour forming part of the eastern Irish fisheries for this species, which also includes Codling Bank to the north. Common mussel Mytilus edulis is the second most commercially important shellfish after whelk. The area inshore from Arklow is considered to be particularly important as a mussel seed bed and for the settlement of larvae. Other shellfish noted in the region included nephrops, great scallop *Pecten maximus*, brown crab *Cancer pagurus*, European lobster Hommarus t, razor clam Ensis siliqua and cockle Cerastoderma edule. In terms of the general shellfish community at Arklow Bank, dredge samples taken as part of the benthic ecology baseline for ABWP Phase 1 identified that the dominant shellfish species included the barnacles Balanus crenatus and Verruca stroemia, common prawn Palaemon serratus and brown shrimp Crangon crangon (Ecological Consultancy Services Ltd., 2001). During the postconstruction benthic sampling programme for ABWP Phase 1 (2004 to 2009) a total of 18 crustaceans and 18 decapod species were recorded, with large numbers of the blue mussel, pink shrimp Pandalus montagui, encrusting barnacle Balanus crenatus, common hermit crab Pagurus bernhardus, shrimp Crangon allmanni and flying/swimming crabs Liocarcinus spp. (including many juveniles) present across many of the survey years (Aquatic Services Ltd., 2010).
- 7.5.3.6 A large portion of the Irish Sea, including the waters off the coast of Wicklow, is considered important as a nursery and spawning area for several species of fish and shellfish (examples shown in Figure 7.9, Figure 7.10 and Figure 7.11). Data from Cefas (Ellis *et al.*, 2012), the Irish Marine Atlas (<u>https://atlas</u>.marine.ie), and fisheries sensitivity maps (Coull *et al.*, 1998) provides spatially explicit maps of the nursery/spawning areas for key species. For example whiting, haddock *Melanogrammus aeglefinus* and cod all spawn to the north of the Lease Area with Wicklow at the southern limit of the spawning area (i.e. approximately 18 km north). Key spawning periods are January to July for whiting, February to June for haddock, and February to April for cod. Nephrops spawns in summer/autumn to the north and south of Arklow. Nursery areas have been mapped overlapping the Lease Area for Atlantic cod, whiting and several species of elasmobranch, as mentioned above. In the wider region, there were mapped nursery areas for herring, haddock and nephrops. Juveniles of many species often favour sheltered inshore waters, and therefore the area within the vicinity of the offshore export cable routes is likely to be important for early life stages.



Figure 7.9: Spawning and nursery grounds for cod and haddock (Ellis et al., 2012).



Figure 7.10: Spawning and nursery grounds for whiting and herring (Ellis et al., 2012).



Figure 7.11: Spawning and nursery grounds for mackerel and nephrops (Ellis et al., 2012).

- 7.5.3.7 The western Irish Sea is home to migratory fish species with Atlantic salmon *Salmo salar* and sea trout *Salmo trutta* the two most commercially important species in the region. The rivers Slaney, Boyne, Dargle and Avoca on the east coast of Ireland are key rivers for migratory fish species with adults migrating upstream between spring and summer and smolts leaving the river in spring (Celtic Sea Trout Project, 2016). The Slaney River Valley is an SAC designated for the protection of Annex II migratory fish including salmon, sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, brook lamprey *L. planeri* and twaite shad *Allosa fallax* as citation features (<u>http://www/npws.ie/protected-sites/sac/000781</u>). This SAC encompasses the freshwater stretches of the River Slaney from the coastal waters of Wexford harbour to the inland reaches of the river as far as the Wicklow mountains and is thought to provide a suitable habitat both for spawning migratory fish and for juveniles of these species. Inland Fisheries Ireland monitor river lamprey in the Avoca as this species is known to migrate to this river and its tributaries to spawn (Inland Fisheries Ireland, 2016).
- 7.5.3.8 Basking shark *Cetorhinus maximus* migrate through the Irish Sea during spring and summer and migration routes cover large distances from the north of Scotland to North Africa. Basking sharks tracked as part of a tagging study were found to move through the Celtic and Irish seas between March to June. This indicated that the area is important for overwintering that links foraging grounds in the waters off the west coast of the UK and Ireland to southern migration destinations.
- 7.5.3.9 Three species of marine turtles are likely to occur in Irish waters including leatherback (or 'leathery') turtle *Dermochelys coriacea*, loggerhead turtle *Caretta caretta* and Kemp's Ridley turtle *Lepidochelys kempii* (King and Berrow, 2009). Of these, leatherback turtle is the most regularly reported around the coast of Ireland, accounting for just over 80% of all records (King and Berrow, 2009). Only single records have been found of hawksbill turtle *Eretmochelys 60mbricate* and green turtle *Chelonia mydas*, both on the south coast of Ireland, and these are thought to be rare vagrants to Irish waters (King and Berrow, 2009). The majority of sightings or strandings records are along the south and west coasts of Ireland, however, there are records of leatherback turtles along the east coast of Ireland suggesting that this species may occur within the Irish Sea.

7.5.4 Potential impacts

7.5.4.1 Table 7.8 presents the potential impacts on fish, shellfish and sea turtle ecology that could arise from the Proposed Development during the construction, operational and maintenance and decommissioning phases.

Potential Impact	Ph	ase		Justification
	С	0	D	
Temporary habitat loss/ disturbance	*	~	•	Construction and decommissioning phases
				• There is potential for temporary, direct habitat loss and disturbance to fish and shellfish habitats as a result of site preparation activities, cable installation activities (including anchor placements), placement of spud-can legs from jack-up operations and decommissioning activities.
				Operational and maintenance phase
				• Temporary habitat loss/disturbance may occur during the operational and maintenance phase of the Proposed Development as a result of maintenance operations (e.g. cable repair/reburial, use of jack-up vessels to facilitate wind turbine component repairs etc.). The impacts associated with these operations are likely to be similar in nature to those associated with the construction phase (albeit to a lesser extent). Sessile or low mobility species may be particularly vulnerable and this impact may lead to temporary loss of spawning/nursery habitat for fish and shellfish.
Increased suspended sediment concentrations and associated deposition	1	~	~	Construction and decommissioning phases
				 Sediment disturbance arising from construction activities (e.g. foundation and cable installation) and decommissioning activities may result in indirect impacts on fish and shellfish communities as a result of temporary increases

Table 7.8: Impacts to be scoped in for the Fish, Shellfish and Sea Turtle Ecology EIAR chapter.
Potential Impact	Phase			Justification
	С	0	D	
				in suspended sediment concentrations (SSC) and associated sediment deposition (i.e. smothering effects).
				Operational and maintenance phase
				• Sediment disturbance arising from maintenance activities (e.g. cable repair/reburial) may result in indirect impacts on fish and shellfish communities as a result of temporary increases in SSC and associated sediment deposition (i.e. smothering effects). The impacts associated with these operations are likely to be similar in nature to those associated with the construction phase although of reduced magnitude.
Injury and/or	~	×	×	Construction phase
disturbance to fish and shellfish from underwater noise and vibration during pile- driving and cable installation activities				• Sound may play an important role in fish and shellfish ecological functioning (e.g. communication or prey detection) and there are some species of fish which have highly developed hearing mechanisms (e.g. herring) and may therefore be particularly sensitive to subsea noise and vibration. The focus of the assessment will be on piling noise generated during foundation installation within the Lease Area and noise arising from cable installation activities. The assessment methodology will follow the latest sound exposure guidelines for fish and invertebrates (Popper <i>et al.</i> , 2014; Hawkins and Popper, 2016).
Injury and/or	~	✓	✓	All phases
disturbance to basking shark and sea turtle from vessel activities				• Increased vessel traffic has the potential to affect basking shark and sea turtles by vessel noise masking auditory signals or by increasing the risk of collision. Vessel type, speed and ambient noise levels will influence the magnitude of this impact and the assessment will therefore consider a range of potential vessels used and the spatial and temporal scale of the uplift in vessel activity. The potential for injury and disturbance from vessel activities to all other fish species has been scoped out.
Long-term habitat loss	×	~	×	Operational and maintenance phase
				 There is the potential for long-term habitat loss to occur directly under all foundation structures and associated scour protection, and under any cable protection required along the inter-array and offshore export cable routes. Sessile or low mobility species may be particularly vulnerable and this impact may lead to long term loss of spawning/nursery habitat for fish and shellfish species.
Alteration of seabed	×	~	×	Operational and maintenance phase
nabitats arising from changes in physical processes				• The presence of foundation structures, associated scour protection and cable protection may introduce localised changes to the tidal flow and wave climate, resulting in changes to the sediment transport pathways and associated effects on fish and shellfish ecology. Some species and communities may be more vulnerable to reductions in water flow if the decrease is sufficient to reduce the availability of suspended food particles, and consequently inhibit feeding and growth. Scour and increases in flow rates can change the characteristics of the sediment potentially making the habitat less suitable for other species.
Changes in	×	1	×	Operational and maintenance phase
Electromagnetic Fields (EMF) from subsea electrical cabling				• Transmission of electricity along subsea cables leads to the emission of low- frequency EMFs. The sensory mechanisms of fish and shellfish could be affected and may lead to avoidance behaviour, disruption in orientation and migratory behaviour, and effects on feeding. In order to reduce the risk of EMF effects on fish and shellfish receptors, a Cable Attenuation Plan will be prepared. The attenuation plan will include an assessment of the EMF attenuation of the specified cables which will feed into recommendations on cable burial depth, micro-siting and cable protection to ensure that the magnetic field strength at the received distances falls within the limits of variation of the earth's magnetic field. Adoption of the measures recommended by the Cable Attenuation Plan would reduce the risk of EMF.
Accidental pollution	1	1	√	All phases

Potential Impact	Phase C O D		hase Justification					
			D					
				• There is a risk of pollution being accidentally released during the construction, operational and maintenance and decommissioning phases from sources including vessels/vehicles and equipment/machinery. The release of such contaminants will be managed by the EMP (see section 6.4) and therefore the likelihood of an accidental spill occurring is very low.				

7.5.5 Impacts scoped out of further assessment

Table 7.9: Impacts to be scoped out of the Fish, Shellfish and Sea Turtle Ecology EIAR chapter.

Potential impact	Justification
Temporary intertidal habitat loss/disturbance	At the Northern Landfall, offshore export cables will be installed via trenchless technologies (such as HDD), thereby avoiding any direct impacts on intertidal habitats, as described in section 7.4. As such, there will be no direct impact on intertidal habitats, with any direct effects of HDD operations limited to either the terrestrial or subtidal environments. As such it is proposed that temporary habitat loss effects on intertidal habitats are scoped out of the EIAR.
Remobilisation of contaminated sediments	Seabed disturbance associated with construction, maintenance and decommissioning activities (e.g. foundation and cable installation) could lead to the remobilisation of sediment-bound contaminants that may result in harmful and adverse effects on fish and shellfish receptors. Recent sampling undertaken in support of a permit application to undertake dredging and disposal works for ABWP Phase 1 (Ramboll, 2016) has demonstrated that contamination in the offshore sediments is low and at levels which are unlikely to result in adverse effects on fish and shellfish receptors. Therefore, it is considered unlikely that there would be any pathways for an impact on fish and shellfish receptors, including consideration of indirect effect through changes to the benthic communities and as such this impact is proposed to be scoped out of the EIAR
Injury and/or disturbance to fish from vessel activities	Underwater noise generated from vessels is likely to be low and effects would only occur if fish species remained within immediate vicinity of the vessel (i.e. within metres) for a number of hours which is highly unlikely. Collision risk is only likely to be a risk to species which spend extended periods on the surface. This impact has therefore been scoped out of the assessment for all fish species, other than basking shark, and for sea turtles.
Disturbance to fish and shellfish from underwater noise and vibration generated by HDD activities during construction	There is potential for elevations in subsea noise during HDD operations at the seaward exit point(s) but this is considered to result in very localised, short-term effects on fish and shellfish and therefore it is proposed that this is scoped out of further assessment.
Disturbance to fish and shellfish from underwater noise and vibration generated by wind turbines during operation	Noise and vibration generated by operational wind turbines is of a very low frequency and low sound pressure level (Andersson <i>et al.</i> , 2011). Studies have found that sound levels are only high enough to possibly cause a behavioural reaction within metres from a wind turbine (Sigray and Andersson, 2011, Andersson <i>et al.</i> , 2011) and that vibration generated by wind farms does not have any detrimental effect on invertebrates (Leonhard, 2000). Concerns, through consultation, have been raised specifically related to whelk species, however these are not considered to be different to other shellfish species. This impact has therefore been scoped out of the assessment.
Removal of hard substrates resulting in loss of colonising communities	The removal of foundations and any scour/cable protection during decommissioning has the potential to lead to loss of shellfish species which colonise these structures as artificial reefs/refugia. This impact is likely to be very localised and only affect species that are of low mobility or sessile. In addition, whilst there is likely to be a shift in community structure (i.e. potentially a different suite of species colonising the area) the removal of such structures would allow for the habitat to revert to pre-construction conditions. Consequently, the fish and shellfish community would return to baseline conditions and therefore it is proposed that this impact is scoped out of the EIAR.

^{7.5.5.1} Table 7.9 presents the impacts to be scoped out of the Fish, Shellfish and Sea Turtle Ecology EIAR chapter.

7.5.6 Proposed assessment methodology

- 7.5.6.1 The EIAR will consider the potential impacts of the construction, operational and maintenance and decommissioning phases of the Proposed Development on fish and shellfish receptors. The assessment methodology will consider the most recent Institute of Ecology and Environmental Management Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2019).
- 7.5.6.2 For the purposes of undertaking the EIAR, all fish and shellfish species that have the potential to occur in the vicinity of the Proposed Development will be identified as Important Ecological Features (IEFs). Where it is appropriate to do so, and particularly where there are large numbers of species characterising a community, the IEFs may be defined as a broad community ecotype with representative species highlighted. Each IEF will then be evaluated based on their legislative status together with the relative importance of the species/ecotypes present in the vicinity of the Proposed Development compared to the ecology of fish and shellfish in the wider region. Impacts on IEFs will be described in terms of their magnitude and correlated against the sensitivity of each IEF to each impact to define the significance (section 6.5).

7.5.7 Designed-in measures and mitigation

- 7.5.7.1 The following designed-in measures are proposed in relation to basking shark and sea turtle:
 - Potential injury to basking shark and sea turtle arising from elevated levels of subsea noise during pile-driving will be mitigated via a Marine Megafauna Mitigation Plan (MMMP) following Ireland's published guidance (DAHG, 2014);
 - The potential for collision risk and disturbance to basking shark and sea turtle from vessels during the construction, operational and maintenance and decommissioning phases will be minimised by following good practice, for example the Code of Conduct developed by Whale Watch West Cork, the Wildlife Safe (WiSe) Scheme as recommended by the Marine Management Organisation (MMO) in the UK, or the Scottish Marine Wildlife Watching Code.
- 7.5.7.2 Any further mitigation requirements for fish, shellfish and sea turtle ecology will be dependent on the significance of the effects.

7.6 Marine mammals

7.6.1.1 This EIAR chapter will consider the potential impacts of the Proposed Development on marine mammals during the construction, operational and maintenance and decommissioning phases.

7.6.1 Study area

7.6.1.1 For the purposes of the EIAR, the Marine Mammal Study Area is defined as the area encompassing the Lease Area including the offshore export cable routes plus an appropriate buffer within which to assess the effects on marine mammals arising from potential impacts. The buffer extends approximately 4 km to the east of the Lease Area and covers the area between the west of the Lease Area and the coast. This is the area covered by the recent aerial digital survey campaign for ornithology and marine mammals. To provide a wider context, the desktop review will also consider the ecology, distribution and abundance of marine mammals within the wider Irish Sea. This Irish Sea Marine Mammal Study Area will also inform the assessment where the ZoI for any of the identified impacts extends beyond the Marine Mammal Study Area (e.g. due to underwater noise from piling). The study areas are illustrated in Figure 7.12.



Figure 7.12: Marine Mammal Study Area, Irish Sea Marine Mammal Study Area, and sites designated for the protection of Annex II marine mammals.

7.6.2 Data sources

Desktop data

7.6.2.1 Information on marine mammal receptors within the Irish Sea and specifically across the Arklow Bank will be collated through a detailed desktop review of existing studies and datasets. Key organisations including NPWS and Irish Whale and Dolphin Group (IWDG) will be contacted to obtain relevant data. Desktop data sources include academic reports, consent applications and surveys to support the designation of SACs for Annex II marine mammal species. Examples of key data sources are listed in Table 7.10, noting that this list is not exhaustive.

Data	Description	Source	
Marine mammals in Irish waters atlas	Distribution and relative abundance of marine mammals in Irish offshore waters.	Wall <i>et al</i> . (2013)	
Biodiversity maps for Ireland	Marine mammal sightings and stranding records from dedicated surveys and from incidental observations.	National Biodiversity Data Centre online mapping tool ⁸	
ObSERVE aerial data	Occurrence, distribution and abundance of cetaceans and seabirds in Irish waters based on aerial survey data (2015 – 2017).	Rogan <i>et al</i> . (2018)	
Protected sites data	Internationally designated sites for the conservation of marine mammals in Irish waters.	NPWS 2011, 2013, 2014a, 2014b, 2014c, 2015	
Harbour porpoise surveys	Various surveys carried out by the IWDG using boat-based visual and aerial sampling techniques.	Berrow <i>et al.</i> (2008; 2013; 2018)	
Harbour and grey seal maps	Updated at-sea distribution maps (mean and upper/lower confidence intervals) based on telemetry data from UK tagged seals and sightings data from the Irish Sea. These updated maps were compared to previous at-sea distribution maps for the Irish Sea which were based upon a 2003 aerial survey of the Irish Sea.	Marine Scotland online ⁹ (Russell <i>et al.</i> , 2017) Jones <i>et al.</i> 2015	
Inshore surveys for cetaceans	Visual and acoustic surveys for cetacean carried out in two survey blocks in the north and south Irish Sea; the northern half of block B was in proximity to the Arklow Bank Wind Park.	Berrow <i>et al.</i> (2010)	
SCANS-II and III	Small cetacean abundance in the North Sea (SCANS) surveys which included the Irish Sea in survey years 2005 (SCANS-II) and in 2016 (SCANS-III).	Hammond <i>et al.</i> (2013) Hammond <i>et al.</i> (2017)	
Special Committee on Seals (SCOS) series	Scientific advice in relation to management of grey seal and harbour seal populations in the UK. Pup production and population trends are described which provide a picture of the health of seal populations around the UK and can be extrapolated to Ireland.	SCOS 2017	

Table 7 10. Key	sources o	of information	for the	marine	mammal	baseline
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Site-specific surveys

7.6.2.2 Site-specific surveys include data collected in support of ABWP Phase 1 and recent surveys commissioned to inform the baseline for the Proposed Development.

⁸ https://maps.biodiversityireland.ie/Map

⁹ https://data.marine.gov.scot/dataset/updated-seal-usage-maps-estimated-sea-distribution-grey-and-harbour-seals

- 7.6.2.3 The site-specific surveys for ABWP Phase 1 include historical boat-based visual surveys undertaken between June 2000 and June 2009 (Figure 7.13). A small amount of acoustic monitoring data was also obtained to the northwest of the ABWP Phase 1 wind turbines over a total of 25 days between 1 August and 1 September 2002.
- 7.6.2.4 In addition, monthly aerial digital surveys were carried out between March 2018 and February 2020, with an additional survey conducted in April 2020 to replace a missed survey due to poor weather conditions in April 2019, ensuring all calendar months were surveyed twice. The aerial surveys were conducted over the Lease Area, plus a 4 km buffer which also extends to the coast to cover the offshore export cable routes (Figure 7.14). This approach has the advantage in that the survey is designed to capture all seabird and marine mammal fauna, without the potential for under recording due to human error. As marine mammals spend a large proportion of their time under the water, the data will be corrected for availability bias to allow for an estimate of the absolute numbers of each species of marine mammal during the surveys. Twenty-four months of aerial survey data (March 2018 to February 2020 and April 2020¹⁰) is available to inform the baseline for the EIAR.

¹⁰ Surveys were also completed during April 2020 as data was not available for April 2019.



Figure 7.13: Study areas for marine mammal boat-based surveys 2000-2009.



Document Name: EOR0765_SCO_016_03_StripTransects_200917

Figure 7.14: Aerial survey area with transects at 2 km spacing, Lease Area and 4 km buffer (March 2018 to February 2020 and April 2020).

7.6.3 Baseline environment

- 7.6.3.1 Twenty-five species of cetacean and two species of pinniped have been recorded in Irish waters, as evidenced from sightings or stranding records¹¹. The high species richness is attributed to the suitability of the physical marine environment (bathymetry, seabed topography, salinity, temperature etc.) and the availability and distribution of prey species in Irish waters. The waters off the west and southwest of Ireland support the greatest diversity and abundance of marine mammals. On the east coast, in the Irish Sea, the more commonly recorded cetaceans include harbour porpoise *Phocoena phocoena*, common dolphin *Delphinus delphis*, bottlenose dolphin *Tursiops truncatus*, killer whale *Orcinus orca*, minke whale *Balaenoptera acutorostrata*, humpback whale *Megaptera novaeangliae*, and fin whale *Balaenoptera physalus*. Both species of pinniped, harbour seal *Phoca vitulina* and grey seal *Halichoerus grypus*, occur commonly in the Irish Sea.
- 7.6.3.2 Marine mammals are protected under Irish and international legislation. National protection includes the Wildlife Act (1976) and Wildlife (Amendment) Act (2000) which protects marine mammals and their habitats from disturbance and wilful interference up to 12 nm from the coast. The Conservation of Species and Habitats Directive (Council Directive 92/43/EEC) provides for protection of marine mammals throughout EU member states through both the designation/classification of SACs as well as the protection of European Protected Species.
- 7.6.3.3 Site-specific baseline data were presented in the 2001 EIS for Arklow Bank from a boat-based survey which was conducted monthly between July 1996 and March 1997. Marine mammals were recorded as part of the seabird surveys following standard European Seabirds at Sea (ESAS) methodology (Webb and Durnick, 1992) and provide a record of marine mammals over the offshore wind farm area (termed the 'Bank'), a 5 km wide buffer around the offshore wind farm (termed the 'Box') and the offshore export cable route from the western boundary of the Box to the landfall. The surveys found that harbour porpoise was the most commonly recorded cetacean species and occurred throughout the surveyed area. Risso's dolphin *Grampus griseus* was infrequently recorded just within the Bank area and only small numbers of seals (most likely all grey seal) were noted during the surveys (Rogan *et al.*, 2018).
- 7.6.3.4 Additional seabird and marine mammal surveys were undertaken monthly in the Bank, Box and offshore export cable route survey areas between 2001 and 2009 and provide further information on marine mammals. Whilst it is acknowledged that there were limitations to the marine mammal data gathered (as the surveys were designed for seabirds as the focal taxon), the data did, nonetheless, provide a relatively long term record of the species most commonly found within the survey area, their seasonality, and the distribution of sightings across the survey area.
- 7.6.3.5 The key findings of these surveys were that harbour porpoise regularly occurred within the Bank and Box survey areas with seasonal peaks in summer and early autumn. Occasional larger counts were made of harbour porpoise inshore along the offshore export cable route. Grey seals were recorded irregularly within the survey area with most sightings along the Bank, but individuals were also counted within the Box and along the offshore export cable route. There was no particular seasonal pattern to the grey seal sightings as individuals were recorded in all seasons over the survey period, with variations in the month they were sighted from year to year. Risso's dolphin was recorded in low numbers along the Bank over the survey period, with sightings generally towards the end of the summer months. Harbour seal were noted as an infrequent visitor within the survey area.

¹¹ Following the sighting of a bowhead whale *Balaena mysticetus* in the Irish Sea in 2017 the total species count for Irish waters has increased from 24 to 25 (IWDG pers. Comm DATE?).

- 7.6.3.6 Data from published sources support the findings that harbour porpoise are a regular feature of the Arklow Bank area. Recent data from the ObSERVE aerial surveys conducted between 2015 and 2016 of cetaceans and seabirds across all Exclusive Economic Zone (EEZ) waters surrounding the Republic of Ireland found that the highest densities of harbour porpoise were in the Irish Sea and to the southwest of Ireland, with summer months consistently showing peaks in abundance (Rogan *et al.*, 2018). The waters to the north of the Arklow Bank, off north County Dublin and to the east of Dublin Bay are thought to be most important for this species within the Irish Sea (Berrow *et al.*, 2008). Consequently, harbour porpoise is a primary citation feature of the Rockabill to Dalkey Island SAC (see Figure 7.12), which is located approximately 37 km to the north of the Lease Area.
- 7.6.3.7 Bottlenose dolphin is the third most frequently recorded cetacean in Irish Waters and has also been recorded in the western Irish Sea, mainly in coastal inshore waters (Berrow *et al.*, 2010). During the ObSERVE surveys, numbers were reported as very low in the west Irish Sea (Rogan *et al.*, 2018) as this species is more likely to occur to the east of the Irish Sea, where there is a resident population in Cardigan Bay in Wales. Risso's dolphin has also been sighted in the Irish Sea, with most sightings off the south Dublin/Wicklow coast (Coveney Wildlife Trust, 2002) or to the south of the Irish Sea (Rogan *et al.*, 2018). Minke whale is the smallest and most frequently recorded baleen whale in Irish waters. Incidental sightings and stranding records suggest that they occur seasonally in the Irish Sea between April and June and during this time are often seen in coastal waters (Berrow *et al.*, 2010). Most minke whale records for the east coast of Ireland were from offshore waters around Dublin Bay and in the northern Irish Sea (Berrow *et al.*, 2011) and this is corroborated by the recent ObSERVE aerial surveys, which reported all Irish Sea sightings of minke whale around the Dublin Bay area (Rogan *et al.*, 2018).
- 7.6.3.8 Published data corroborates the finding that grey seal occurs in the west Irish Sea and may be using the habitat around Arklow Bank. Inshore boat-based surveys noted grey seal in both the northern and southern parts of the Irish Sea (Berrow *et al.*, 2011). Harbour seal have also been noted during these inshore surveys, albeit in smaller numbers compared to grey seal and this suggests that they may use the habitat around the Lease Area infrequently. Key haul outs for both species are to the north of Dublin Bay and off the coast of County Wexford in the southeast of Ireland. Further information on seal counts will be sought as part of the baseline from the NPWS annual seal count database. Both grey seal and harbour seal are citation features for the Lambay Island SAC which lies approximately 63 km to the north of the Lease Area, off the coast of Portrane (north County Dublin) (Figure 7.12). The Slaney River Valley SAC, approximately 45 km to the southwest of the Lease Area lists harbour seal as one of the citation features (Figure 7.12). Just outside the Irish Sea geographic boundary (approximately 65 km from the Lease Area), the Saltee Islands SAC is designated for protection of grey seal (Figure 7.12).

7.6.4 Potential impacts

7.6.4.1 Table 7.11 presents the potential impacts on marine mammals that could arise from the Proposed Development during the construction, operational and maintenance and decommissioning phases.

Potential impact	Phase			Justification
	С	0	D	
Injury and/or disturbance to marine mammals from underwater noise during pile-driving	•	×	×	 Construction phase Marine mammals use sound for foraging, orientation, communication and predator avoidance and therefore may be sensitive to elevated levels of noise in the marine environment that may impair auditory function or disrupt normal behaviour. The assessment of effects will be based upon site-specific subsea noise modelling to determine the potential ranges over which injury or disturbance could occur in each of the key species within the Marine Mammal Study Area. The assessment methodology will follow the latest guidelines on subsea noise thresholds and species audiograms (National Marine Fisheries Service (NMFS), 2018; NMFS, 2005).

Table 7.11: Impacts to be scoped in for the Marine Mammals EIAR chapter.

Potential impact	Pha	se		Justification
	С	0	D	
Injury and/or disturbance to marine mammals from vessel activities	~	~	~	 All phases Increased vessel traffic has the potential to affect marine mammals by vessel noise masking auditory signals or by increasing the risk of collision. Vessel type, speed and ambient noise levels will influence the magnitude of this impact and the assessment will therefore consider a range of potential vessels used and the spatial and temporal scale of the uplift in vessel activity.
Changes in the fish and shellfish community affecting prey resources	•	~	~	 All phases Changes to the prey species community as a result of construction, operational and decommissioning activities may indirectly affect marine mammals due to potential changes in resource availability. This could lead to changes in the distribution of marine mammals if there are changes in the distribution and abundance of prey species or reduced foraging success if prey resources are depleted.
Accidental pollution	•	~	•	 All phases There is a risk of pollution being accidentally released during the construction, operational and maintenance and decommissioning phases from sources including vessels/vehicles and equipment/machinery. The release of such contaminants will however be managed by the EMP (see section 7.6.7.1) and therefore the likelihood of an accidental spill occurring is very low.
Changes in Electromagnetic Fields (EMF) from subsea electrical cabling	×	V	×	 Operational and maintenance phase Transmission of electricity along subsea cables leads to the emission of low-frequency EMFs. As magneto-sensitive species, the sensory mechanisms of marine mammals could be affected which may lead to avoidance behaviour, disruption in orientation, and effects on feeding or social interaction. In order to reduce the risk of EMF effects on marine mammal receptors, a Cable Attenuation Plan will be prepared. The attenuation plan will include an assessment of the EMF attenuation of the specified cables which will feed into recommendations on cable burial depth, micro-siting and cable protection to ensure that the magnetic field strength at the received distances falls within the limits of variation of the earth's magnetic field. Adoption of the measures recommended by the Cable Attenuation Plan would reduce the risk of EMF.

7.6.5 Impacts scoped out of further assessment

7.6.5.1 Table 7.12 presents the impacts to be scoped out of the Marine Mammals EIAR chapter.

Table 7.12: Impacts to be scoped out of the Marine Mammals EIAR chapter.

Potential impact	Justification
Increased suspended sediment concentrations and associated deposition	Marine mammal vision is adapted to deal with lower levels of light in the marine environment and vision can be an important cue in navigation, avoiding obstacles and detecting prey. Whilst elevated levels of suspended sediment concentrations (SSC) arising during construction and maintenance activities may decrease light availability in the water column and produce turbid conditions, the maximum impact range is expected to be localised with sediments rapidly dissipating over one tidal excursion. The Zol for suspended sediment is not anticipated to overlap any key areas for marine mammals (i.e. SACs designated for marine mammals or in proximity to seal haul-outs) and the area affected is likely to be small in the context of the wider available habitat. Therefore, it is proposed that this impact is scoped out of the EIAR.
Remobilisation of contaminated sediments	Seabed disturbance associated with construction, maintenance and decommissioning activities (e.g. foundation and cable installation) could lead to the remobilisation of

Potential impact	Justification
	sediment-bound contaminants that may result in harmful and adverse effects on marine mammals. Recent sampling undertaken for ABWP Phase 1 (Ramboll, 2016) has demonstrated that contamination in the offshore sediments is low and at levels which are unlikely to result in adverse effects on marine mammals. Therefore, it is considered unlikely that there would be any pathways for an impact on marine mammals, including consideration of indirect effect through changes to the benthic or fish and shellfish communities (see section 7.4).
Injury and/or disturbance to marine mammals from operational underwater noise	The majority of studies investigating the impact of operational offshore wind farms on marine mammals and fish conclude that sounds levels in the order of hundreds of metres distance from the wind turbines would likely be audible, but not at a level sufficient to cause injury or behavioural changes. Norro <i>et al.</i> (2011) compared measurements of a range of different foundation methods and turbine ratings in the Belgian part of the North Sea, as well as comparing those to other European waters. The authors found a slight increase in Sound Pressure Level (SPL) compared to the ambient noise measured before the construction of the wind farms. They concluded that even the highest increases found within the dataset (20 to 25 dB re 1µ Pa) are likely to be within the natural range of variation in baseline noise and therefore, even with the long-term nature of this impact (lifespan of the wind farm), the operational noise would not cause a significant impact. In addition, evidence presented by Hastie <i>et al.</i> (2015) showed tracked harbour seal moving between operational wind turbines in order to forage. It is predicted therefore that any impact would be highly localised and unlikely to affect marine mammals

7.6.6 Proposed assessment methodology

- 7.6.6.1 The EIAR will consider the potential impacts of the construction, operational and maintenance and decommissioning phases of the Proposed Development on marine mammal receptors. The assessment methodology will consider the most recent Institute of Ecology and Environmental Management Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2019); Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects (Judd, 2012); and Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters (NPWS, 2014).
- 7.6.6.2 For the purposes of undertaking the EIAR, all marine mammal species that have the potential to occur in the vicinity of the Proposed Development will be identified as IEFs. The valuation of IEFs will be based on their legislative status together with the relative importance of the populations present within the Marine Mammal Study Area compared to the wider regional marine mammal populations in the Irish Sea. Impacts on IEFs will be described in terms of their magnitude and correlated against the sensitivity of each IEF to that impact to produce a statement of significance (see section 6.5).

7.6.7 Designed-in measures and mitigation

- 7.6.7.1 The following designed-in measures are proposed in relation to marine mammals:
 - Preparation of a MMMP to reduce the potential for injury to marine mammals during piledriving; and
 - Adoption of good practice by following a pre-defined code of conduct for vessel operators during the construction, operational and maintenance and decommissioning phases to reduce the risk of disturbance/collision to marine mammals, for example: Code of Conduct developed by Whale Watch West Cork (2009), the Wildlife Safe (WiSe) Scheme as recommended by the MMO in the UK (www.wisescheme.org), or the Scottish Marine Wildlife Watching Code (SNH, 2017).
- 7.6.7.2 Any further mitigation requirements for marine mammals will be dependent on the significance of the effects.

7.7 Offshore ornithology

7.7.1.1 This EIAR chapter will consider the potential impacts of the Proposed Development on offshore ornithology during the construction, operational and maintenance and decommissioning phases.

7.7.1 Study area

7.7.1.1 The Offshore Ornithology Study Area has been defined through consideration of potential impacts on offshore ornithological receptors and the suitability of this area for the purposes of EIA, with the ZoI varying for the species and season being assessed. The Offshore Ornithology Study Area includes the Lease Area and a 4 km buffer (see Figure 7.15).

7.7.2 Data sources

Desktop data

- 7.7.2.1 Relevant literature and data sources will be reviewed and used to inform the EIAR including:
 - Relevant literature on species baseline data, collision risk, flight heights and avoidance rates (Band, 2012, Wright *et al.,* 2012; Johnston *et al.,* 2014a,b; Cook *et al.,* 2014; WWT Consulting, 2014; Statutory Nature Conservation Bodies (SNCB), 2014; McGregor *et al.,* 2018; Bowgen and Cook, 2018; Cummins *et al.,* 2019);
 - Relevant literature on disturbance and displacement (SNCBs 2017; Natural England and Joint Nature Conservation Committee (JNCC), 2012; Garthe and Hüppop, 2004);
 - ObSERVE aerial seabird survey data collected between 2015 and 2016 across all Exclusive Economic Zone (EEZ) waters surrounding the Republic of Ireland (Jessopp *et al.*, 2018);
 - Existing offshore wind farm EISs (e.g. Codling Bank, Oriel) where available; and
 - A review of assessment methodologies for offshore wind farms (e.g. Maclean *et al.,* 2009, SNH).
- 7.7.2.2 Burke (2018) has identified current seabird data gaps relating to Irish waters. Species which have lower levels of confidence relating to numbers and distribution will be assessed with appropriate acknowledgement of these uncertainties in the EIAR (and NIS):
 - Location and significance of seabird colonies: although a national census of seabird colonies took place in 2015 to 2018, some gaps remain, most notably for burrow-nesting species including puffin, Manx shearwater and storm-petrel, as well as some low-density cliff colonies, and urban gull populations;
 - **Key foraging areas**: there is a lack of Global Positioning System (GPS) tracking data for some species including gulls, terns and cormorant. For other species such as auks, much current GPS tracking work in Ireland is biased to a few easily accessible colonies; and
 - **Non-breeding season distribution at sea**: targeted surveys are required for storm petrel, and in inshore waters for divers, grebes and seaducks, to better understand non-breeding season distributions.

Site-specific surveys

7.7.2.3 Seabird monitoring (boat-based surveys 2000 to 2009 and Wicklow Head colony counts 2001 to 2010) was undertaken between 2000 and 2010 to inform the ABWP EIS and provide construction and post-construction monitoring for ABWP Phase 1. These surveys provide a valuable span of continuous seabird data which reveals both species-specific seasonal patterns and the degree of inter-annual variation present in the marine environment. These data have been reviewed to determine if changes in seabird densities before and after construction can be detected (MacArthur Green, 2018). This analysis did not find any significant changes in abundance or distribution which could be attributed to the ABWP Phase 1 (although given the small size of this wind farm and the inherent variability of the marine environment this result is not untypical of such analyses). Since these data were collected, changes in seabird distribution and abundance, both locally and as part of wider population trends, may have occurred. The digital aerial surveys, which commenced in March 2018, were therefore commissioned to provide an updated dataset which reflects any changes in conditions within the survey area or wider Irish Sea, compared to the original baseline data. All available survey data, as described below, will be used to inform the EIAR (and NIS).

Boat-based Surveys 2000 to 2009

7.7.2.4 Boat-based surveys of seabird activity on the Arklow Bank and surrounding area were undertaken between July 2000 and June 2009 in order to characterise the baseline environment for the 2001 EIS and for the purposes of post-construction monitoring at ABWP Phase 1. Data analysis revealed seasonal trends for the key species present and provided a time series of seabird activity and abundance in the area during this period. A summary of the results of the analyses will be presented in the EIAR.

Aerial Surveys 2018 to 2020

- 7.7.2.5 Seabird monitoring recommenced in advance of the 2018 breeding season (March 2018), with standard monthly aerial surveys undertaken by HiDef Aerial Surveying Limited ('HiDef') using an aircraft equipped with high-resolution HiDef Gen II digital video cameras with sensors set to a resolution of 2 cm Ground Sample Distance (GSD). The intended survey campaign was completed after two years in February 2020, with an additional survey conducted in April 2020 to replace a missed survey due to poor weather conditions in April 2019, ensuring all calendar months were surveyed twice.
- 7.7.2.6 The aerial survey covered a larger area than the boat surveys; digital video images were collected over a series of strip transects spaced 2 km apart across the Survey Area, which included a 4 km buffer around the Lease Area and also extended to the north of the Lease Area to include Wicklow Head and to the west to cover the area inshore of Arklow Bank up to and including the coastline (Figure 7.15). Each camera sampled a strip of 125 m width, separated from the next camera by approximately 25 m, thus providing a combined transect width of 250 m. The target coverage for the survey was 10%, therefore data from a 100 m strip width have been analysed from each camera (i.e. a total transect width of 200 m, spaced at 2 km (BSH, 2013)).
- 7.7.2.7 The results from these surveys provide a comprehensive dataset covering two years and will be used to calculate average bird density and abundance estimates for the Lease Area and appropriate buffers in each calendar month. These will be used as the basis for the EIAR. The mean density and abundance for each bird species each month will be calculated as the average of the individual monthly mean values (i.e. across two estimates, except for July, for which an additional survey was conducted and therefore three estimates are available). The results will also be compared with the baseline boat-based 2000 to 2009 dataset to determine if the previous temporal and spatial patterns have been maintained.

Wicklow Head Colony Counts 2001 to 2010

7.7.2.8 The seabird colony at Wicklow Head, approximately 7 km from the Lease Area, was surveyed in each summer from 2001 to 2010 to estimate the sizes of breeding seabird populations (see MacArthur Green, 2018). In addition, Birdwatch Ireland has supplied colony counts from surveys conducted in 2014 and 2015 and NPWS provided counts from 2018 and 2019. These data will be used to inform breeding season reference populations which will be assessed against potential ornithological impacts of the Proposed Development during construction, operation and decommissioning.

Intertidal survey 2019 to 2020

7.7.2.9 Surveys of the landfall site have been conducted during the 2019 to 2020 nonbreeding season and the 2020 breeding season. These have been conducted from land and/or from a survey vessel. These surveys have ensured coverage of the zone between that surveyed for terrestrial ornithology (which extends to the high water mark) and the marine surveys (up to a minimum of the low water mark, but potentially higher depending on the tide state when surveys were conducted). Thus, the inclusion of these specific intertidal surveys, which include a degree of spatial overlap, has ensured there is no gap in survey coverage. Although there is a risk of double counting (i.e. including sensitive species in both the offshore and intertidal assessments) this will be avoided through consideration of sensitive species' habitat preferences (i.e. consideration of the risk of inclusion in both assessments) and also the timing of the surveys. All bird species recorded within the potential area of construction disturbance will be considered in the EIAR.



Figure 7.15: Aerial survey design showing Arklow Bank with transects at 2 km spacing, Lease Area and 4 km buffer.

7.7.3 Baseline environment

Seabird species

- 7.7.3.1 Species that were recorded during the site-specific baseline surveys (2000 to 2009) and monthly aerial surveys (2018 to 2020) are presented in Table 7.13, together with an overview of relevant seasons for each species based on information from Furness (2015) and Snow and Perrins (1998).
- 7.7.3.2 Reference populations for each species and population sizes will be based on the best available information at the time of undertaking the assessment and will be consulted on and discussed with key stakeholders. The conservation status of each species will also be taken into consideration.

-

Mar-Aug

Mar-Aug

Apr-Aug

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Species		Breeding	Migration-free	Migration –	Winter	Migration –	Non-breeding
Common name	Scientific name		breeding	autumn		spring	
Common scoter	Melanitta nigra						Oct-Mar
Red-throated diver	Gavia stellata	Mar-Aug	May-Aug	Sep-Nov	Dec-Jan	Feb-Apr	-
Black-headed gull	Chroicocephalus ridibundus	-	Apr-Jul	-	-	-	Aug-Mar

May-Jul

May-Jul

May-Jul

May-Jul

-

Aug-Nov

Aug-Nov

Aug-Oct

-

Dec

Dec

Nov-Feb

-

Jan-Apr

Jan-Apr

Mar-Apr

Table 7.13: Species recorded during site-specific surveys and definitions of biological seasons (from Furness, 2015 and Snow and Perrins 1998^a).

Kittiwake	Rissa tridactyla	Mar-Aug	May-Jul	Aug-Dec	-	Jan-Apr	-
Little gull	Larus minutus	Apr-Jul	May-Jul	-	-	-	Aug-Apr
Guillemot	Uria aalge	Mar-Jul	Mar-Jun	Jul-Oct	Nov	Dec-Feb	Aug-Feb
Puffin	Fratercula arctica	Apr-Aug	May-Jun	Jul-Aug	Sep-Feb	Mar-Apr	Mid-Aug-Mar
Razorbill	Alca torda	Apr-Jul	Apr-Jul	Aug-Oct	Nov-Dec	Jan-Mar	-
Common tern	Sterna hirundo	May-Aug	Jun-Jul	Jul-Sep	-	Apr-May	-
Arctic tern	Sterna paradisaea	May-Aug	Jun	Jul-Sep	-	Apr-May	-
'Commic' tern	Sterna sp.	May-Aug	Jun	Jul-Sep	-	Apr-May	-
Sandwich tern	Thalasseus sandvicensis	Apr-Aug	Jun	Jul-Sep		Mar-May	-
Arctic skua	Stercorarius parasiticus	May-Jul	Jun-Jul	Aug-Oct	-	Apr-May	-
Fulmar	Fulmarus glacialis	Jan-Aug	Apr-Aug	Sep-Oct	Nov	Dec-Mar	-
Manx shearwater	Puffinus	Apr-Aug	Jun-Jul	Aug-Oct	-	Mar-May	-
Gannet	Morus bassanus	Mar-Sep	Apr-Aug	Sep-Nov	-	Dec-Mar	
Great skua	Stercorarius skua	May-Aug	May-Jul	Aug-Oct	Nov-Feb	Mar-Apr	-
Shaq	Phalacrocorax aristotelis	Feb-Aua	Mar-Jul	Aug-Oct	Nov	Dec-Feb	Sep-Jan

a Note that for many species there are months which overlap between seasons. To avoid double counting of impacts across adjacent seasons, such overlapping months have only been included in one season, and this will be defined in the relevant section of the EIAR.

Common gull

Herring gull

Great black-backed gull

Lesser black-backed gull

Larus canus

Larus fuscus

Larus marinus

Larus argentatus

Aug-Apr

Sep-Mar

Sep-Feb

-

- 7.7.3.3 Kittiwake was the most abundant species recorded at sea during boat-based surveys (2000 to 2009), especially on the Arklow Bank, with highest numbers in the early winter period (October and November). Low to moderate numbers were also recorded during the remainder of the year, with a pre-breeding peak. Higher densities were recorded following construction of ABWP Phase 1 both in the wider area and on the bank, which may indicate attraction to the shallower waters on the bank during the non-breeding periods. Kittiwakes were also one of the most abundant species recorded during the aerial surveys (2018 to 2020), with peaks recorded in January and February 2020. The majority of the individuals were recorded as adults, although small numbers of juveniles were also recorded in all calendar months.
- 7.7.3.4 Guillemot and razorbill were recorded in moderate to high numbers in all months of boat-based surveys. Guillemot numbers peaked in May and July both in the wider area and also on the Arklow Bank. There were higher peak densities prior to construction of ABWP Phase 1 both on the bank and in the wider area. While the pattern on the bank could indicate avoidance of ABWP Phase 1, the similar pattern in the wider area suggests this was part of a wider trend. Guillemot has been the most abundant species recorded during aerial surveys, especially in May and August 2018, and July 2019 when over 1,000 individuals were recorded across the entire survey area in each survey.
- 7.7.3.5 Razorbill numbers peaked in early mid-winter (September to November) during the boat-based survey period. In contrast to guillemot, peak densities were higher following construction of ABWP Phase 1, however there was no clear pattern across the year in either the wider area or the bank. During aerial surveys, razorbills were recorded in relatively low numbers apart from in September 2018 when over 870 observations were made. During June when numbers were lowest, birds were seen in the northwest of the survey area close to the coast.
- 7.7.3.6 Fulmars were observed in most months during the boat-based survey period, albeit in low numbers, with moderate peaks in March and July. There were generally higher densities before construction of ABWP Phase 1, in both the wider area and on the bank, with a slightly clearer trend on the bank which may indicate avoidance of ABWP Phase 1. During aerial surveys, fulmars were recorded in low numbers; none were recorded in February, March, November or December and the highest number of birds recorded in any one survey was five in April 2020.
- 7.7.3.7 Gannets have been recorded in all months, but during boat-based surveys were present in generally low numbers between May and November with peaks in May and also between August and October. There was no clear trend in the before and after densities, but numbers may have decreased post-construction of ABWP Phase 1 in the Arklow Bank area. Gannet numbers peaked in August during aerial surveys. During the breeding season between April to August, more gannets were recorded near the coast compared with the spring and autumn migration periods. Manx shearwaters were recorded on boat-based survey between March and October in moderate numbers, peaking in May and September. There were no apparent trends in the presence before or after construction of the ABWP Phase 1. During aerial surveys, Manx shearwaters peaked in May with over 900 records in 2018, and a second lower peak occurred in August 2018.
- 7.7.3.8 Most gull species (black-headed gull, great black-backed gull, herring gull and lesser black-backed gull) were recorded in variable but low numbers in most months. In general, there were no clear trends in presence prior to and after construction of ABWP Phase 1. Common gulls were almost entirely absent between April and September, with peaks in November and February, particularly on Arklow Bank. Presence before construction of ABWP Phase 1 was higher outside the bank, whereas presence post-construction was higher on the bank. This may indicate attraction of birds to the turbines (e.g. for roosting), but it may be a chance effect. Little gulls were recorded with two distinct peaks either side of the breeding season, the higher one in November, and the lower in April, consistent with passage movements.
- 7.7.3.9 Great skuas were only recorded between July and November, in very low numbers. This is consistent with post-breeding dispersal movements through the Irish Sea. Arctic skuas were recorded in low numbers between April and November only, with most observations made in September.

- 7.7.3.10 Red-throated divers were recorded in all months during boat-based surveys (2000 to 2009), albeit in very low numbers outside of a mid-winter peak period from December to February. With the exception of a mean January peak on the bank, densities in all months were higher before construction of ABWP Phase 1 than post-construction. This may indicate avoidance of the wind farm. During aerial surveys red-throated divers were recorded in low to moderate numbers in all calendar months except between June to August when none were recorded. Numbers peaked during the winter season and 95 birds were recorded in December 2019. The locations were all on the Arklow Bank, with a small number of observations close to the ABWP Phase 1 wind turbines.
- 7.7.3.11 Common and Arctic terns were recorded between April to September. Numbers of both species peaked in August 2018, with common tern observations concentrated over the Arklow Bank, and Arctic terns recorded within the Lease Area and 2 km buffer.

Designated sites

- 7.7.3.12 The closest designated site to the Lease Area is the Wicklow Head Special Protection Area (SPA), approximately 7 km to the northwest, for which kittiwake is a named qualifying feature, being present in nationally important numbers during the breeding season (NPWS, 2020) (note that the SPA also hosts regionally important numbers of fulmar, guillemot and razorbill). Given the proximity of this colony to the Survey Area it is highly likely that individuals recorded during the breeding season originate from this SPA.
- 7.7.3.13 Colony monitoring was conducted at this SPA between 2001 and 2010. All the species monitored (kittiwake, guillemot, razorbill, fulmar and shag) increased across this period, with mean annual rates of growth between 2.3% (razorbill) and 11.2% (fulmar). Kittiwake was the most numerous breeder and numbers increased from 783 adults on nest (Apparently Occupied Nest (AON)) in 2001 to 948 AON in 2010. Guillemot numbers increased from an estimated 507 to 773 individuals, with razorbills increasing from 179 to 220 individuals over the same period. Although for most of the species these trends do not appear to have continued since 2010, the most recent population counts from 2015 lie within the ranges recorded previously. Thus, while this may indicate population declines it may also simply be a reflection of typical inter-annual variations.
- 7.7.3.14 Kittiwake productivity varied between 2001 and 2010 with a mean of 0.74 chicks per pair (range 0.38 to 1.1). Across the period monitored, there is a suggestion of an overall increase in productivity, but this trend was not significant.
- 7.7.3.15 The most recent counts of kittiwake for this colony recorded 674 AON in 2018 and 773 AON in 2019. The average annual growth rate (i.e. year to year change) over the period 2001 to 2019 was 3.5%. Over this same period the national trend has been a 32% reduction (Cummins *et al.,* 2019).
- 7.7.3.16 There are several other seabird colonies designated as SPAs within species-specific foraging range of Arklow Bank and for which there is potential connectivity, including:
 - Howth Head Coast (designated for breeding populations of kittiwake);
 - Ireland's Eye (designated for breeding populations of cormorant, herring gull, kittiwake, guillemot and razorbill);
 - Saltee Islands (designated for breeding populations of fulmar, gannet, cormorant, shag, lesser black-backed gull, herring gull, kittiwake, guillemot, razorbill and puffin);
 - Grassholm (designated for breeding gannet); and
 - Lambay Island (designated for breeding populations of fulmar, cormorant, shag, lesser blackbacked gull, herring gull, kittiwake, guillemot, razorbill and puffin and wintering greylag goose).
- 7.7.3.17 Assessment of the potential impacts on the features of these designated sites will be provided in the NIS.

7.7.4 Potential impacts

7.7.4.1 Table 7.14 presents the potential impacts on offshore ornithology that could arise from the Proposed Development during the construction, operational and maintenance and decommissioning phases. These impacts will be assessed for bird species that were recorded during boat-based and aerial surveys within the Offshore Ornithology Study Area, as well as those likely to be present in the vicinity of the Proposed Development including true pelagic birds (e.g. gannet and fulmar), other species that spend part of their annual life cycle at sea (e.g. divers and gulls) and non-seabird migrants (e.g. wildfowl, waders and passerines).

Table 7.14: Impacts to be scoped in for the Offshore Ornithology EIAR chapter.

Potential	Phase			Justification			
impact	С	0	D				
Disturbance	~	√	√	Construction and decommissioning phases			
and displacement				• Construction activities (including installation of wind turbines and associated vessel traffic) within the Lease Area has the potential to directly affect bird populations through visual and noise disturbance, leading to displacement. This would effectively result in temporary habitat loss through a reduction in the area available for feeding, loafing and moulting.			
				• Noise and vibration related to construction activities (particularly pile driving) and decommissioning activities, and associated vessel traffic (e.g. cable laying vessels), as well as direct disturbance by vessels, have the potential to disturb and displace bird species for the duration of installation activities.			
				• The susceptibility of each species to construction disturbance will depend upon factors such as the feeding strategy of the species (i.e. aerial, swimming or surface) and timing of construction activities and behaviour (whether birds are breeding or migrating). The EIAR (and NIS) will be informed by reviews of species sensitivity (e.g. Garthe and Hüppop, 2004; Burke, 2018).			
				Operational and maintenance phase			
				• The presence of wind turbines has the potential to directly disturb and displace birds from within and around the Lease Area. This is assessed as an indirect habitat loss, as it has the potential to reduce the area available to birds for feeding, loafing and moulting. The lighting of wind turbines and associated ancillary structures could also attract (or repel) certain species of birds and affect migratory behaviour on a local scale.			
Indirect	~	√	~	Construction and decommissioning phases			
effects upon prey species and habitats				• Indirect impacts on birds may occur during the construction and decommissioning phases, due to impacts on prey species and the habitats of prey species. These indirect effects include those resulting from the production of underwater noise (e.g. during piling) and the generation of suspended sediments (e.g. during seabed preparation activities) that may alter the behaviour or availability of bird prey species.			
				• Underwater noise may cause fish and mobile invertebrates to avoid the construction area and also affect their physiology and behaviour. Elevated suspended sediments may cause fish and mobile invertebrates to avoid the construction area and may smother and hide immobile benthic prey within the immediate area. These mechanisms could potentially result in less prey being available in the area adjacent to active construction works to foraging seabirds.			
				Operational and maintenance phase			
				• Indirect displacement of birds may occur during the operational and maintenance phase, due to impacts on prey species and the habitats of prey species. These indirect effects include those resulting from the temporary disturbance/loss of habitat, Electromagnetic Fields (EMFs) and the generation of suspended sediments (e.g. due to scour or maintenance activities) that may alter the behaviour or availability of bird prey species.			
				 Maintenance operations resulting in the temporary loss or disturbance of habitat, EMF and elevated suspended sediment could potentially cause fish and mobile invertebrates to avoid the operational area and also affect their physiology and behaviour. Consideration of these potential impacts will be provided, however 			

Potential	Phase			Justification
impact	С	0	D	
				there is very little evidence to support this and in fact there is growing evidence gathered from existing offshore wind farms which suggests that the opposite may be true (Kerckhof <i>et al.</i> , 2010; Emu, 2008; Krone <i>et al.</i> , 2013; Linley <i>et al.</i> , 2008 and Wilhelmsson, 2006).
Collision risk	×	√	×	Operational and maintenance phase
				• There is a risk of birds colliding with turbine structures as they fly through the wind farm during operation. The susceptibility of species to collision risk depends upon physiological and behavioural characteristics of the species, in addition to the Proposed Development design specifications.
Barrier	×	~	×	Operational and maintenance phase
effects				 During operation, the presence of the wind turbines and OSPs may act as a barrier to free movement, causing birds to alter and lengthen their flight path to avoid the wind farm. This may increase energetic expenditure during foraging flights and migration (DECC, 2009). It has been shown that some species (e.g. divers and scoters) avoid wind farms by making detours around wind turbine arrays, which potentially increases their energetic costs (Petersen <i>et al.</i>, 2006; Petersen and Fox, 2007), with an associated potential risk of decreased survival chances. Such effects may have a greater impact on birds that regularly commute around a wind farm (e.g. birds transiting between foraging grounds and roosting/nesting sites) than migrants that would only negotiate around a wind farm once per migratory period, or twice per annum, if flying the same return route (Speakman <i>et al.</i>, 2009). The proximity of the Proposed Development to the coast, particularly Wicklow Head (13 km), means that the area is likely to be of importance to some species during the breeding season (e.g. kittiwake, auk species) and therefore the potential for increases in regular (commuting) flight distances will be considered in the EIAR (and NIS). The potential for impacts during the migration period will also be considered. However, due to typically very small increases in distance relative to total migration path and limited exposure, barrier effects are expected to be very small.

7.7.5 Impacts scoped out of further assessment

7.7.5.1 Table 7.15 presents the impacts to be scoped out of the Offshore Ornithology EIAR chapter.

Table 7.15: Impacts to be scoped out of the Offshore Ornithology EIAR chapter.

Potential impact	Justification
Disturbance and displacement (maintenance vessels)	During the operational and maintenance phase, the presence of vessels and personnel undertaking routine operations and maintenance activity at the wind farm and along the offshore export cable route may cause localised, temporary disturbance and displacement. However due to the nature of this impact (temporary/localised), any displaced birds may readily redistribute to areas of lower or no activity on site without impacting on fitness. It is therefore proposed that this impact is scoped out of the EIAR.
Species-specific effects	Due to different ecological requirements and behaviour, different species have variable susceptibility to many of the impacts discussed above. For example, species such as guillemot and razorbill fly close to the sea surface and are therefore very unlikely to be at risk of collision with turbine rotors. Hence such species will be scoped out of the collision assessment. Similarly, species such as large gulls are not regarded as susceptible to displacement from operational wind farms and therefore these species will be scoped out of the operational displacement assessment. The basis for species-specific scoping out along these lines will be presented in the EIAR (and NIS).

7.7.6 Proposed assessment methodology

7.7.6.1 Full and detailed methodology for the EIAR (and NIS) will be consulted on and discussed with relevant stakeholders (e.g. NPWS). The Developer has met with representatives of NPWS in 2019 and 2020 and had also met with Birdwatch Ireland in 2018, at which the Proposed Development and potential ornithological impacts have been discussed. The following sections provide an overview of the assessment methodology.

Identification of species and sensitivity

- 7.7.6.2 The monthly aerial bird surveys of the Lease Area, associated buffer and inshore areas will provide the key data source for the ornithology site characterisation and quantification of parameters for the assessment (e.g. displacement and collision risk modelling (CRM)). Additionally, information from the previous boat-based surveys (2000 to 2009) as well as recent wider studies in the Irish Sea (Jessop *et al.*, 2018 and Rogan *et al.*, 2018) will provide contextual information.
- 7.7.6.3 The aerial surveys will provide information on species (or species-groups if species identification is not possible) abundance, distribution, behaviour, location, numbers, sex and age (where possible), flight heights and direction. The EIAR (and NIS) will consider the nature of the use of the site by birds recorded, including seasonal differences and activities (i.e. foraging, overwintering, migrating or other) in order to determine the importance of the site relative to the wider area for seabirds throughout the year.
- 7.7.6.4 The intertidal surveys will be used to consider the potential construction impacts on species in the vicinity of the cable landfall. This will be based on appropriate disturbance buffers around activity (e.g. around construction vessels).
- 7.7.6.5 The potential impacts on other terrestrial species which may pass the Proposed Development on migration (e.g. wildfowl and waders) will be assessed using UK industry standard methods (e.g. Wright *et al.* 2012).
- 7.7.6.6 Data analysis for the EIAR (and NIS) will consider seasonal differences in site usage by each key species as well as the importance of the site for the life stages of each species. Analysis will include abundance and density estimates (with associated confidence intervals and levels of precision).
- 7.7.6.7 Reference populations for each species and population sizes will be based on the best available information at the time of undertaking the assessment and will be consulted on and discussed with key stakeholders.
- 7.7.6.8 The sensitivity of each species will be determined based on the size of its population, its conservation status and its known sensitivity to offshore wind farms, using industry standard data sources (e.g. Skov *et al.*, 1995; Garthe and Hüppop, 2004; and Furness and Wade, 2012). Species identified as sensitive receptors will be subject to an assessment against the impacts listed above. The assessment will be undertaken in line with guidance by CIEEM (2019) and expert opinion.

Displacement

7.7.6.9 The UK Statutory Nature Conservation Bodies (SNCBs) issued a joint Interim Displacement Guidance Note (Natural England and JNCC, 2012 and SNCBs, 2017), which provides recommendations for presenting information to enable the appraisal of displacement effects in relation to offshore wind farm developments in English and Welsh waters. This guidance, together with species-specific reviews of the evidence for displacement at operational wind farms, will be used to inform the EIAR (and NIS).

- 7.7.6.10 There are a number of different measures used to determine bird displacement from areas of sea in response to activities associated with an offshore wind farm. Furness and Wade (2012), for example, use disturbance ratings for particular species, alongside scores for habitat flexibility and conservation importance to define an index value that highlights the sensitivity to disturbance and displacement. A similar approach is used by Ramiro and Cummins (2016) within an Irish context, as reported in Burke (2018).
- 7.7.6.11 A matrix approach (SNCBs, 2017; NE and JNCC, 2012) will be used as a framework for calculating a range of predicted impact magnitudes. These relate varying levels of displacement to varying levels of additional consequent mortality, with consideration then given to the population-level impacts of the potential additional mortality. For species at risk of displacement during the nonbreeding season, consideration will be given to a proposed approach for standardising assessments (i.e. to account for different numbers of nonbreeding seasons between species for which data is available). Evidence presented in recent wind farm assessments will be used to inform the species-specific rates of displacement and mortality used in the assessments (e.g. Vattenfall, 2019).

Collision risk modelling

- 7.7.6.12 Collision risk modelling (CRM) will be undertaken using industry-standard approaches (e.g. Band, 2012; McGregor *et al.*, 2018) to predict potential mortality levels from this impact and the consequences of this for relevant populations. The parameter values used, such as for avoidance rates, flight heights and nocturnal activity levels, will be based upon the best available evidence and will be consulted on and discussed with relevant stakeholders (e.g. NPWS) with clearly defined methods presented in the EIAR (and NIS).
- 7.7.6.13 In addition to CRM to assess collision risk, where appropriate, population models (e.g. Population Viability Analysis (PVA)) will be undertaken to provide guidance on the potential population consequences of estimated impacts. These models will be constructed in accordance with best practice for such methods (e.g. WWT *et al.*, 2012) with an emphasis on the relative outcomes for impacted versus un-impacted population projections.

7.7.7 Designed-in measures and mitigation

- 7.7.7.1 The following designed-in measures are proposed in relation to offshore ornithology:
 - Mitigation through project design (e.g. in terms of the number of wind turbines) is a type of primary mitigation and is an inherent aspect of the EIA process.
- 7.7.7.2 The need for any further mitigation (and the feasibility of such measures in relation to ornithological receptors) will be dependent on the outcomes of the analysis and modelling of the potential impacts on seabirds. Consultation with key ornithological stakeholders (e.g. NPWS) will be ongoing throughout the EIA process and will include discussion of the need for mitigation and monitoring.

7.8 Offshore bats

- 7.8.1.1 It is proposed that a Technical Report is provided in the EIAR to address bat ecology.
- 7.8.1.2 A total of nine bat species are resident in Ireland, belonging to two families (Bat Conservation Ireland, 2020). Many of these species of bat are known to be migratory outside of Ireland, particularly in continental Europe where more northerly breeding species migrate southwards during the autumn and return north in the spring. While it is understood that bats undertake seasonal migrations within Ireland, due to a lack of scientific studies, bat migration to/from Ireland is less well understood. However, bat vagrancy/migration has been noted by Bat Conservation Ireland in addition to the nine resident species, one individual each of Brandt's bat and greater horseshoe bat have been recorded, with both species likely to be vagrants (Bat Conservation Ireland, 2020).

7.8.1.3 The Technical Report will provide a desk-based literature review addressing bat populations of Ireland, their migratory behaviours and likelihood to be observed offshore, potential impact pathways, and sensitivity to impacts.

7.9 Commercial fisheries and aquaculture

7.9.1.1 This EIAR chapter will consider the potential impacts of the Proposed Development on commercial fisheries and aquaculture during the construction, operational and maintenance and decommissioning phases.

7.9.1 Study area

- 7.9.1.1 The Proposed Development is located in International Council for the Exploration of the Sea (ICES) Division VIIa (Irish Sea). Fisheries data are recorded and collated by statistical rectangles within each ICES Division. The Commercial Fisheries and Aquaculture Study Area has therefore been defined with reference to the ICES rectangles within which the Proposed Development is located. As shown in Figure 7.16 these are as follows:
 - Rectangle 34E3: inshore rectangle within which the majority of the offshore export cable routes are located; and
 - Rectangle 34E4: rectangle within which the Lease Area and a small section of the offshore export cable routes are located.



Document Name: RPS_ARK_00_013_1_Commercial_Fisheries_Study_Area_20200915

Figure 7.16: Commercial Fisheries and Aquaculture Study Area.

7.9.2 Data sources

- 7.9.2.1 The principal sources of data and information used to inform the baseline characterisation with regard to fishing activity are anticipated to include:
 - Marine Institute's Inshore Fishing Activity Dataset (www.data.gov.ie);
 - Atlas of Commercial Fisheries around Ireland (Gerritsen et al., 2014);
 - Atlas of Commercial Fisheries for Shellfish around Ireland (Tully, 2017);
 - Irish landings data by ICES rectangle (www.cso.ie);
 - Vessel Monitoring System (VMS) data effort data by method (Ireland's Marine Atlas);
 - Baseline information gathered through consultation with fisheries stakeholders; and
 - Information on the distribution of fishing vessels gathered as part of shipping and navigation assessment (see section 7.9).
- 7.9.2.2 In order to help inform the assessment, particularly in respect of activity by the under 10 m fleet which are not recorded in VMS data, consultation has been undertaken with local fisheries stakeholders. Consultation with the fishing industry is ongoing and will continue throughout the life cycle of the Proposed Development.

7.9.3 Baseline environment

Existing fisheries

- 7.9.3.1 An indication of the principal species targeted in the Commercial Fisheries and Aquaculture Study Area and of the fishing methods used is given in Figure 7.17 and Figure 7.18 for ICES rectangles 34E3 and 34E4, respectively. This is based on landings data for the period 2015 to 2017 provided by the Marine Institute (2020). It should be noted that data for vessels below 10 m in length does not specify the fishing method. It is understood, however, that in areas relevant to the Proposed Development, potting is the principal method used by vessels in the under 10 m size category.
- 7.9.3.2 As shown in Figure 7.17, in inshore rectangle 34E3 the majority of landings are from small vessels (under 10 m vessels) that target whelks. Larger vessels (over 10 m in length) also fish for whelks in this rectangle, as well as in rectangle 34E4, where potting for whelks also constitutes the main fishing activity (Figure 7.18).
- 7.9.3.3 A range of other fishing methods are recorded within the Commercial Fisheries and Aquaculture Study Area in the landings dataset, including pelagic trawling, dredging, bottom otter trawling, seine netting and beam trawling. However, these make a very small contribution to the overall landings from the Commercial Fisheries and Aquaculture Study Area and are for the most part associated with vessels over 10 m in length (Figure 7.17 and Figure 7.18).



Figure 7.17: Annual landings weights (tonnes) from rectangle 34E3 (average 2013 to 2017).







7.9.3.4 As illustrated in Figure 7.17 and Figure 7.18, it is apparent that in the Commercial Fisheries and Aquaculture Study Area, fishing is primarily undertaken by potters targeting whelks. Analysis of landings data by port suggest that the whelk fishery is primarily undertaken by local vessels, with the majority of the landings recorded from the Commercial Fisheries and Aquaculture Study Area being into Wicklow, Arklow and Courtown (Table 7.16 and Figure 7.16).

Table 7.16: Annual average landings from the Commercial Fisheries and Aquaculture Study Area(ICES rectangles 34E3 and 34E4) by port.

Port	Over 10 m vessels (annual average 20	operating pots 15 to 2017)	Under 10 m vessels (all methods) (annual average 2015 to 2017)		
	Landings (tonnes)	% of total landings	Landings (tonnes)	% of total landings	
Wicklow	844.7	49.5%	409.3	46.6%	
Arklow	554.4	32.5%	226.5	25.8%	
Courtown	33.3	2.0%	241.6	27.5%	
Other	273.1	16.0%	0.0	0.0%	

7.9.3.5 The baseline information outlined above is in line with the information provided in the 2001 EIS which identified potting for whelks as the main fishery in the area, with other fisheries active at low levels and primarily undertaken by visiting vessels.

Aquaculture

7.9.3.6 As noted in the 2001 EIS, the Commercial Fisheries and Aquaculture Study Area is known to support a seed mussel fishery. Seed mussel beds local to Arklow Bank are primarily located in inshore areas off Wicklow (Marine Institute, 2018). A licence was granted in 2018 for the cultivation of mussel in proximity to the Proposed Development between Clogga Bay and Kilmichael Point (Figure 7.19). The licensed site is located to the south of the most southerly offshore export cable route at a distance of approximately 4.5 km at its closest point.



Figure 7.19: Aquaculture in the vicinity of the Proposed Development.

7.9.4 Potential impacts

7.9.4.1 Table 7.17 presents the potential impacts on commercial fisheries and aquaculture that could arise from the Proposed Development during the construction, operational and maintenance and decommissioning phases.

Table 7.17: Impacts to be scoped in for the Commercial Fisheries and Aquaculture EIAR chapter.

Potential	Phase			Justification	
impact	С	0	D		
Loss of grounds or restricted access to fishing grounds	C ✓	○	D ✓	 Construction and decommissioning phases Construction activities (e.g. presence of vessels, partially installed infrastructure, vulnerable sections of cable awaiting burial or protection) and decommissioning activities may result in a temporary loss of or restricted access to fishing grounds to fishing fleets that are normally active in the area. Operational and maintenance phase Whilst fishing activity will be permitted within the Lease Area, the physical presence of infrastructure may result in a loss of or restricted access to fishing grounds to fishing fleets that are normally active in the area. In addition, the undertaking of maintenance works during the operational phase may result in additional localised and short-term loss of grounds. In the context of this assessment it is important to note that from the information available to date, it is understood that the Lease Area sustains limited levels of fishing activity. In addition, fishing would be able to continue in the area of the offshore export cable routes (once cables have been buried/protected) and the operational wind farm. As such, any loss of fishing grounds during the operational phase would be expected to be very small. 	
Displacement of fishing activity into other areas	•	•	•	 Construction and decommissioning phases Fishing activity which would normally take place in the area of the Proposed Development may be displaced to other areas as a result of loss of grounds or restricted access during construction and decommissioning. This could in turn result in increased competition for fishing on grounds in other areas. Operational and maintenance phase Whilst fishing activity will be permitted within the Lease Area, any loss of or restricted access to fishing grounds during the operational and maintenance phase (see impact above) may lead to displacement of fishing on grounds in other areas. Given the low levels of fishing activity within the Lease Area (see above) and the expected small area potentially lost to fishing during the construction, operational and maintenance and decommissioning phases, any resulting displacement of fishing activity would also be very small. 	
Interference with fishing activities	•	•	•	 Construction and decommissioning phases During the construction and decommissioning phases there may be potential for transiting vessels associated with the Proposed Development to cause interference with vessels engaged in fishing and/or with fishing gear. The assessment will evaluate the potential for conflicts to arise as a result of this and identify good practice approaches to minimise effects. Operational and maintenance phase During the operational and maintenance phase there may be potential for transiting maintenance vessels to cause interference with vessels engaged in fishing and/or with fishing gear. The assessment will evaluate the potential for conflicts to arise as a result of this and identify good practice approaches to minimise effects. 	
Increased steaming times to fishing grounds	•	•	•	 Construction and decommissioning phases The need for vessels to avoid areas in the proximity of construction and decommissioning works and partially installed infrastructure would result in short term increases in steaming distances and times. The potential for an effect to occur would largely depend on the location of construction works and infrastructure associated with the Proposed Development, relative to the location of fishing grounds and preferred steaming routes. Operational and maintenance phase 	

Potential	Phase			Justification	
impact	С	Ο	D		
				• The presence of infrastructure associated with the Proposed Development could result in increases in steaming distances and times for fishing vessels. The impact would largely depend on the location of infrastructure associated with the Proposed Development relative to the location of fishing grounds and preferred steaming routes, and on the layout of the infrastructure and minimum spacing between turbines.	
Effects on commercially exploited species	✓	√	✓	Construction and decommissioning phases	
				• There are a number of activities associated with the construction and decommissioning phases which have the potential to affect fish and shellfish species, including those of commercial importance (whether fished or farmed). This may in turn result in effects on commercial fishing and/or aquaculture activities. The assessment will take account of the effects identified in the Fish, Shellfish and Sea Turtle Ecology EIAR chapter and evaluate whether these have potential implications for commercial fishing and aquaculture activities.	
				Operational and maintenance phase	
				• There are a number of activities associated with the operational and maintenance phase which have potential to affect fish and shellfish species, including those of commercial importance (whether fished or farmed). This may in turn result in effects on commercial fishing and/or aquaculture activities. The assessment will take account of the effects identified in the Fish, Shellfish and Sea Turtle Ecology EIAR chapter and evaluate whether these have potential implications for fishing and aquaculture activity.	
Potential for snagging of gear	√	√	✓	All phases	
				• The potential for gear snagging and manoeuvrability issues will be identified and assessed. Other navigational safety issues associated with the construction of the Proposed Development (i.e. collision, allision) will be addressed in the Shipping and Navigation EIAR chapter.	

7.9.5 Impacts scoped out of further assessment

7.9.5.1 No potential impacts are proposed to be scoped out of the EIAR with regards to commercial fisheries.

7.9.6 Proposed assessment methodology

- 7.9.6.1 The commercial fisheries assessment will be focused on key fishing fleets active in areas relevant to the Proposed Development. These will be identified through detailed analysis of available fisheries data (i.e. landings and VMS data) and information collected through consultation with fisheries stakeholders.
- 7.9.6.2 For each potential impact the assessment will be undertaken on a fleet by fleet basis following the standard methodology approach outlined in section 6.5. An exception to this is the assessment of safety issues for fishing vessels (i.e. potential snagging of gear), which will consider potential risks and propose adequate measures to ensure that the safety of fishing vessels remains within acceptable limits. The assessment of safety issues will take account of the findings of the Shipping and Navigation EIAR chapter.
- 7.9.6.3 The commercial fisheries assessment will be undertaken with reference to relevant guidance, including but not limited to:
 - Guidance on EIS and NIS Preparation for Offshore Renewable Energy Projects (DCCAE, 2017);
 - FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison: FLOWW (Fishing Liaison with Offshore Wind and Wet Renewables Group) (2014);

- FLOWW Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Disruption Settlements and Community Funds. FLOWW (Fishing Liaison with Offshore Wind and Wet Renewables Group) (2015);
- International Cable Protection Committee (2009) Fishing and Submarine Cables Working Together; and
- Sea Fish Industry Authority and UK Fisheries Economic Network (UKFEN) (2012) Best practice guidance for fishing industry financial and economic impact assessments.

7.9.7 Designed-in measures and mitigation

- 7.9.7.1 The following designed-in measures are proposed in relation to commercial fisheries:
 - Ongoing consultation with the fishing industry and continued engagement with the appointed Fisheries Liaison Officer (FLO);
 - Development of a Fisheries Management and Mitigation Strategy (FMMS);
 - Timely and efficient distribution of Notice to Mariners (NtM) and navigational warnings of the position and nature of works associated with the Proposed Development;
 - The location of any areas of cable protection would be communicated to the fishing industry to prevent damage to and from fishing gear, ensuring the safety of vessels operating in the area;
 - Use of guard vessels and Offshore Fisheries Liaison Officers (OFLOs), as required; and
 - Undertaking of post-installation surveys and burial inspection surveys and, where appropriate and practicable, undertaking of rectification works.
- 7.9.7.2 Any further mitigation requirements for commercial fisheries will be dependent on the significance of the effects.

7.10 Shipping and navigation

7.10.1.1 This chapter will consider the potential impacts of the Proposed Development on shipping and navigation during the construction, operational and maintenance and decommissioning phases.

7.10.1 Study area

7.10.1.1 The Shipping and Navigation Study Area (see Figure 7.21) has been defined as the Lease Area plus a 10 nm buffer, which also encompasses the offshore export cable routes.

7.10.2 Data sources

- 1.1.1 The following desktop and site-specific data sources will be used to inform the baseline conditions:
 - Automatic Identification System (AIS) data between 4 March 2018 and 31 March 2018 (28 days);
 - AIS data between 1 July 2018 and 28 July 2018 (28 days);
 - Vessel traffic survey data collected during a geophysical survey:
 - AIS data between 13 July 2019 and 27 August 2019 (approximately 45 days); and

- Manual (visual) observations of non-AIS targets during same period (effective survey period of approximately 21 days).
- Admiralty Sailing Directions Irish Coast Pilot NP40 (United Kingdom Hydrographic Office (UKHO), 2016);
- Marine Casualty Investigation Board (MCIB) incident reports (1992 to 2018);
- Royal National Lifeboat Institution (RNLI) incident data (RNLI, 2008 to 2017);
- Marine Irish Digital Atlas (MIDA, revised 2018);
- East and North Coasts of Ireland Sailing Directions (Irish Cruising Club, 12th Edition 2014);
- OSPAR Offshore Renewables and Dumping at Sea data layers (2016/2017); and
- UK Admiralty Charts 1410 and 1411 (UKHO, 2018).
- 1.1.2 It is noted that not all vessels are required to carry AIS mandatorily, including recreational vessels, smaller fishing vessels, and naval vessels. There may also be limited downtime in AIS coverage on occasion, although this is not expected to be significant or affect the completeness of the vessel traffic baseline. The vessel traffic survey undertaken in summer 2019 includes visual observations, thus augmenting the AIS data, although it is noted that the non-AIS data was of limited range and duration (approximately 21 days) and therefore some activity will not have been identified. However, consultation has advised that there is no significant seasonal variation in fishing activity during the year and it is known that summer captures the peak period for recreational vessels.

7.10.3 Baseline environment

Navigational features

- 7.10.3.1 Figure 7.20 presents the charted navigational features in proximity to the Lease Area. The Lease Area is located approximately 3.2 nm to 7 nm from shore. Charted water depths (UKHO, 2018) within the Lease Area range between 1 m and 34 m at Lowest Astronomical Tide (LAT), with the presence of Arklow Bank resulting in the high variation. It is noted that water depths over this sandbank are subject to frequent change and in foggy weather it is advised that vessels should not approach within a distance of 50 m. Recent data from a site-specific bathymetry survey carried out in 2019 recorded water depths within the Lease Area between 0.9 m and 51.3 m LAT.
- 7.10.3.2 The ABWP Phase 1 wind turbines and meteorological mast are located within the Lease Area, including a submarine cable approximately 8.3 nm in length from one of the wind turbines to landfall at Arklow. A separate monopile with Lidar installed is also located within the northern part of the Lease Area.
- 7.10.3.3 There are two IMO Routeing Measures in the region which may be used by vessel traffic passing in proximity to the Lease Area. These are the Off Tuskar Rock Traffic Separation Scheme (TSS) and Off Skerries TSS, located approximately 26 nm south and 46 nm north east of the Lease Area, respectively (not shown in Figure 7.20).
- 7.10.3.4 The North Arklow Light north cardinal buoy carries AIS and is located within the Lease Area. This buoy advises shipping that safe water is found to the north and that vessels should be aware of a navigational hazard to the south, in this case the reduced depth of Arklow Bank. There are numerous other aids to navigation within proximity to the Lease Area including the South Arklow Light south cardinal buoy, approximately 750 m south of the Lease Area, which has a Radar Beacon (Racon) in addition to AIS.

- 7.10.3.5 A pilot boarding place is located approximately 5.2 nm west of the Lease Area in the vicinity of Arklow (although based on the AIS data for the area there is limited pilotage activity). A charted anchorage is located approximately 9.7 nm southwest of the Lease Area near Polduff Harbour. This anchoring location is considered useful for southbound traffic in south westerly winds and awaiting a fair tide. It is noted that vessels may anchor outside of designated anchorage locations in the absence of restrictions.
- 7.10.3.6 A submarine cable runs north-south approximately 8.3 nm east of the Lease Area. There are no submarine pipelines charted in the area. There are a large number of charted wrecks in the area with up to six located within the Lease Area; one of these has 33 m depth and the other has unknown depth. The closest charted wreck outside of the Lease Area is located approximately 580 m from the south eastern corner and has 46 m depth. It should be noted that there may be other wrecks not marked on charts as they are not considered to be of navigational significance (see section 7.13).
- 7.10.3.7 A Military Practice and Exercise Area (PEXA) is located 14 nm east of the Lease Area. There are no restrictions in place with regard to the right for vessels to transit within such areas with firing only taking place when the areas are considered to be clear of all shipping.

Vessel traffic

7.10.3.8 Figure 7.20 presents the vessel traffic recorded on AIS within the Shipping and Navigation Study Area, based on 70 days of AIS data collected during 2018 to 2019, colour-coded by vessel type. The Shipping and Navigation Study Area has been designed to ensure that vessel movements in proximity to the Lease Area are adequately considered whilst still ensuring the assessment is site specific.


Document Name: Navigational_Features_ANA-SCO-01

Figure 7.20: Navigational features in proximity to the Lease Area.



Document Name: AIS_VesselType_ANA-SCO-02

Figure 7.21: AIS data within the Shipping and Navigation Study Area colour-coded by vessel type (70 Days AIS, 2018/19).

7.10.3.9 On average, 28 unique vessels per day were recorded within the Shipping and Navigation Study Area. Of these, 1 to 2 vessels per day on average crossed the Lease Area boundary (the majority of these clipping the northern corner). Figure 7.22 presents the distribution by vessel type within the Shipping and Navigation Study Area in 2018/19. This shows that the main types of vessels within the Shipping and Navigation Study Area during the study period were cargo vessels (52%), recreational vessels (21%) (mostly during summer periods) and fishing vessels (12%). Dublin was the most frequently broadcast destination.



Figure 7.22: Vessel type distribution within the Shipping and Navigation Study Area (70 Days AIS, 2018/19).

7.10.3.10 Figure 7.23 presents a vessel density grid based on the 2018/19 AIS data mapped over the Shipping and Navigation Study Area. It can be seen that there are two busy north-south routes, mainly used by cargo vessels, passing east of Arklow Bank. The western fringe of one route intersects the north eastern corner of the Lease Area, while the other has a mean position approximately 10 nm east of the Lease Area (note, only part of this route is within the Shipping and Navigation Study Area). Roll on Roll off (Ro-Ro) commercial ferries were prominent on these routes, with Cobelfret Ferries and Atlantic Container Line (ACL) being two key operators. Tankers (approximately 9% of all vessel traffic) were also recorded on these routes, particularly the route intersecting the Lease Area. Other busy areas were associated with a north-south route passing inshore of Arklow Bank, and approaches to Arklow Harbour.



Document Name: AIS_VesselDensity_ANA-SCO-03

Figure 7.23: Density map of AIS data within the Shipping and Navigation Study Area (70 Days AIS, 2018/19).

- 7.10.3.11 An average of three unique fishing vessels per day passed within the Shipping and Navigation Study Area, with relatively similar volumes of fishing vessel traffic recorded during summer and winter. This is in line with feedback during consultation which suggested that there is no significant seasonal variation in fishing activity levels during the year. The majority of fishing traffic was located inshore of the Lease Area following the Irish coastline with a large volume of traffic in and out of Arklow and Wicklow harbours. From consultation there is estimated to be around 10 to 11 fishing vessels operating out of Arklow Harbour, with no more than half the vessels using AIS. Therefore, Figure 7.21 under-represents fishing activity. However, it was stated in consultation that non-AIS fishing vessels will follow similar tracks to those shown on AIS. Some non-AIS fishing activity was observed during the vessel traffic survey but this was limited in range.
- 7.10.3.12 An average of seven unique recreational vessels per day passed within the Shipping and Navigation Study Area over the entire study period, with the majority recorded during the summer survey periods, averaging 11 per day in both July 2018 and 2019, compared to less than one per day in winter. This pattern agrees with the consultation feedback from Arklow Marina, with their season running from May to the end of August and visitor numbers varying from about three to four per day in May to six to eight per day in other summer months. Additional non-AIS recreational vessels were sighted during the vessel traffic survey but this was limited in range. As with fishing vessels, the majority of recreational traffic was located inshore of the Lease Area, following the Irish coastline. Again, this corresponds well with the Arklow Marina feedback, with most visitors being to/from other Irish east coast calling points to the north and south, such as Dublin and Kilmore Quay.
- 7.10.3.13 A small number of maintenance vessels were recorded in the survey, associated with the ABWP Phase 1 wind turbines.
- 7.10.3.14 Vessels which travelled at a speed of less than one knot for more than 30 minutes are assumed to potentially be at anchor. After applying these criteria, a total of nine vessels were identified. These were all cargo vessels recorded during the summer survey periods, with the majority located in the approaches to Wicklow Harbour. No anchoring was identified within the Lease Area itself.

Historical incidents

- 7.10.3.15 From a review of Royal National Lifeboat Institution (RNLI) incident data there were 390 lifeboat launches to 299 unique incidents within the Shipping and Navigation Study Area during the 10-year period between 2008 and 2017, corresponding to an average of 30 unique incidents per year. Incidents were concentrated in and around the ports of Wicklow, Arklow and Courtown with relatively few incidents occurring in open waters. Four incidents occurred within the Lease Area with three of these involving a 'person in danger'. All RNLI lifeboat launches were from four stations: Wicklow (45%), Arklow (35%), Courtown (18%) and Rosslare Harbour (1%).
- 7.10.3.16 A review of MCIB (1992 to 2018) data indicated a grounding incident on Arklow Bank on 14 January 2014. The general cargo vessel MV Arslan II was en-route between Nemrut (Turkey) and Belfast (Northern Ireland) when the Master decided to alter course and seek shelter from forecast winds of Beaufort Force 6. The vessel then ran aground on the Arklow Bank and was refloated several hours later having suffered damage to the rudder and bottom of the hull. The vessel could not proceed to port under its own power and was therefore anchored close to the incident location awaiting the arrival of a tug. The vessel was then taken under tow to Dublin. There was no pollution caused by the incident and no injuries sustained.

7.10.4 Potential impacts

7.10.4.1 Table 7.18 presents the potential impacts on shipping and navigation that could arise from the Proposed Development during the construction, operational and maintenance and decommissioning phases.

Table 7.18: Impacts to be scoped in for the Shipping and Navigation EIAR chapter.

Potential	Ph	Phase		Justification				
impact	С	0	D					
Displacement of vessel traffic	•	•	•	 All phases From the AIS data reviewed, there is a busy north-south route, the edge of which intersects the north eastern corner of the Lease Area. During construction this route may be displaced due to the presence of a buoyed construction area including 500 m advisory safety zones around structures undergoing construction and advisory clearance distances around vessels. During the operational and maintenance phase this route may be displaced due to the presence of wind farm structures and any temporary advisory safety zones around structures or advisory clearance distances around vessels. Other routes pass close to the eastern and western extremities of the Lease Area boundary and could potentially be displaced by wind turbines located along the perimeter. The number of structures installed and final positions will affect the magnitude of the impact. The north-south route includes a large number of BoBo commercial ferries which 				
				 The north-south four fielders a large humber of four or commercial femes which operate timetabled services transiting between Dublin and Zeebrugge/Rotterdam. However, any displacement is likely to have a minor impact on transit times. The impact is likely to be similarly low to other traffic in the area, which already avoids Arklow Bank due to the shallow water depths. Decommissioning phase effects associated with the removal of offshore infrastructure are envisaged to be the same or similar to those described for the construction phase. 				
Port access	✓	✓	✓	Construction and decommissioning phases				
restrictions				 Port access may be affected, in particular Arklow, given the proximity of the Lease Area. However, from the AIS data it can be seen that the majority of existing port users are small craft which head north or south rather than crossing Arklow Bank. The presence of construction and decommissioning vessels at port may also restrict access for other vessels although the effect will depend upon the intensity of activity at the ports(s) selected for the construction works. Operational and maintenance phase 				
				 Port/harbour access may be affected given the proximity of the Lease Area to Arklow Harbour. From the baseline AIS data it can be seen that the majority of port users are small craft which head north or south rather than crossing Arklow Bank. This includes a small amount of activity from service vessels supporting the ABWP Phase 1 wind turbines. The location of the operational and maintenance base for the Proposed Development is Arklow Harbour. The Proposed Development will increase the frequency of service vessel traffic, and there may be additional activity during major maintenance. Consultation will be carried out with Arklow Harbour. 				
Increased collision risk	•	•	•	 Construction and decommissioning phases The displacement of passing vessels may lead to an increase in the risk of a vessel-to-vessel collision with other third party vessels. It is anticipated that commercial traffic would generally choose to avoid areas where construction works are ongoing and therefore would pass around the Lease Area. This would reduce the available sea room in the vicinity of the Lease Area and may lead to an increase in the number of vessel-to-vessel encounters and consequently increased collision risk. However, as vessels are already avoiding the Arklow Bank due to its shallow water depth, the displacement effect is anticipated to be limited. 				
				 Additionally, the presence of construction and decommissioning vessels may lead to an increase in the risk of a vessel-to-vessel collision between a vessel associated with the Proposed Development and a third party vessel. Vessels associated with the Proposed Development would include larger vessels such as heavy lift vessels (HLV) and jack-up vessels which when undertaking construction work would be restricted in their ability to manoeuvre (RAM). This would be a temporary effect and depend upon the base port(s) being used. Procedures and consultation may be used to mitigate any impact. 				
				Operational and maintenance phase				
				 The presence of vessels during periods of maintenance may lead to an increase in the risk of a vessel-to-vessel collision between a vessel associated with the Proposed Development and a third-party vessel. Maintenance vessels would include larger vessels such as heavy lift vessels (HLV) and jack-up vessels which when undertaking maintenance work would be restricted in their ability to manoeuvre (RAM) as 				

Potential	Phase			Justification					
impact	С	0	D						
				well as smaller support vessels during routine maintenance. Again, the impact would depend upon the base port(s) being used. Procedures and consultation may be used to mitigate any impact.					
Increased	✓	√	✓	Construction and decommissioning phases					
allision risk				• The physical presence of partially completed structures, or completed structures which have not yet been commissioned, would create an additional powered allision (i.e. contact) risk to passing vessel traffic (noting the pre-existing allision risk due to the ABWP Phase 1 wind turbines). Similarly, there is an additional drifting allision risk to vessel traffic which is not under command (NUC).					
				 It is noted for both forms of allision that the shallow water at Arklow Bank may prevent some vessels experiencing an allision since a vessel may be more likely to ground on the bank prior to alliding with a wind farm structure, depending on its draft and the prevailing conditions. However, the AIS survey analysis showed vessels crossing the Lease Area boundary, especially at the northern edge. Therefore, there is potential for allision, especially at the extremities of the Lease Area. 					
				• Decommissioning phase effects associated with the removal of offshore infrastructure are envisaged to be the same or similar to those described for the construction phase.					
				Operational and maintenance phase					
					• The physical presence of the wind farm structures would create an additional powered allision risk to passing vessel traffic (noting the pre-existing allision risk due to the ABWP Phase 1 wind turbines). Similarly, there is an additional drifting allision risk to vessel traffic which is not under command (NUC).				
				• It is noted for both forms of allision that the low water depth at Arklow Bank may prevent some vessels experiencing an allision since a vessel may be more likely to ground on the bank prior to alliding with a wind farm structure, depending on its draft and the prevailing conditions. However, the vessel traffic survey analysis showed vessels crossing the Lease Area boundary, especially at the northern edge. Therefore, there is potential for allision, especially at the extremities of the Lease Area.					
Cable	✓	√	✓	Construction and decommissioning phases					
interaction risk				• There is a risk of interaction with the offshore export cables routeing back to shore if they are exposed following laying prior to protection being applied. Both vessel anchors and fishing gear have potential to snag the offshore export cables. Any temporary risk can be mitigated via the circulation of information and use of a guard vessel to protect exposed cabling.					
									• Decommissioning phase effects associated with the removal of offshore infrastructure are envisaged to be the same or similar to those described for the construction phase.
				Operational and maintenance phase					
					 There is a risk of interaction with the offshore export cables routeing back to shore. Both vessel anchors and fishing gear have potential to snag the offshore export cables. This can be mitigated through suitable cable protection, e.g. burial. 				
				• Where a cable cannot be sufficiently buried there may be cable protection put in place which would reduce the navigable water depth for passing vessels. This may lead to a grounding risk, although it is noted that those vessels which pass west of the Lease Area (where the offshore export cables would be located) are generally shallower draught (fishing vessels and recreational craft) and therefore a reduction in navigable water depth is less likely to impact such vessels.					
Diminished	✓	1	✓	Construction and decommissioning phases					
emergency response capability				• The construction and decommissioning of the Proposed Development may result in an increase in the number of incidents in the area which require an emergency response. Consequently, the emergency response capability for the area (including SAR and pollution response) may be diminished. This effect will be mitigated through the implementation of an emergency response plan.					
				Operational and maintenance phase					
				 I ne presence of the Proposed Development may result in an increase in the number of incidents in the area which require an emergency response, in particular during periods of major maintenance. Consequently, the emergency response capability for the area (including SAR and pollution response) may be diminished. This effect will be mitigated 					

Potential impact	Phase C O D	Justification
		through the implementation of an emergency response plan. The final layout chosen for the Proposed Development may also require consideration in relation to ensuring safe access in the area for SAR providers.

- 7.10.5 Impacts scoped out of further assessment
- 7.10.5.1 There are no impacts that have been scoped out of the assessment at this stage.
- 7.10.6 Proposed assessment methodology
- 7.10.6.1 The Irish Coast Guard, Commissioners of Irish Lights and the Marine Survey Office have been consulted with respect to guidance that should be followed for the shipping and navigation assessment. The following guidance is considered to be relevant:
 - Revised Guidelines for Formal Safety Assessment (FSA) in the IMO (International Maritime Organization) Rule-Making Process (IMO, 2018);
 - Recommendation O-139 On the Marking of Man-Made Offshore Structures (IALA, 2013);
 - Marine Guidance Notice (MGN) 543 (M+F) Safety of Navigation: OREIs UK Navigational Practice, Safety and Emergency Response (Maritime and Coastguard Agency (MCA), 2016); and
 - Methodology for Assessing the Marine Navigational Safety Risks of Offshore Wind Farms (MCA, 2013).
- 7.10.6.2 A Navigational Risk Assessment will be completed and summarised in the EIA.

7.10.7 Designed-in measures and mitigation

- 7.10.7.1 The following designed-in measures are proposed in relation to shipping and navigation:
 - Marking and lighting;
 - Liaison with ports and their users;
 - Fisheries liaison;
 - Notices to Mariners;
 - Advisory safety zones and advisory clearance distances;
 - Details included on Charts and in Sailing Directions;
 - Appropriate procedures for vessel operations during construction and maintenance;
 - Emergency response procedures;
 - Cable protection measures informed by cable risk assessment;
 - Collision risk management during construction;
 - Appropriate certification for project vessels;
 - Provision of self-help capability;

- Implementation of buoyed areas during appropriate phases;
- Compliance from all vessels associated with the Proposed Development and third-party vessels with COLREGs (IMO, 1972/77) and SOLAS (IMO, 1974);
- Use of a temporary guard vessel (where justified by risk assessment); and
- Vessel Traffic Monitoring by AIS during the construction phase.
- 7.10.7.2 Any further mitigation requirements for shipping and navigation will be dependent on the significance of the effects.

7.11 Civil and military aviation

7.11.1.1 This chapter will consider the potential impacts of the Proposed Development on civil and military aviation during the construction, operational and maintenance and decommissioning phases.

7.11.1 Study area

7.11.1.1 The Civil and Military Aviation Study Area is determined by the range of the aviation receptors that could potentially be affected, in particular, Air Traffic Control (ATC) radar systems. The Civil and Military Aviation Study Area covers radars on the east coast of Ireland that could potentially detect the wind turbines within the Lease Area; with the extent of the Civil and Military Aviation Study Area defined by the furthest potential aviation receptor, Dublin Airport's Primary Surveillance Radar (PSR). The Civil and Military Aviation Study Area also covers airspace designations including low flying areas and military practice areas that intersect or are adjacent to the Lease Area and offshore export cable routes; airspace used by helicopters on routes which may cross the Lease Area; and within 9 nm of the Lease Area (based on potential for helicopter access to oil and gas platforms) (see Figure 7.24 which displays all aeronautical information within the bounds of the figure, however only airspace designations relevant to the Proposed Development are labelled).



Figure 7.24: Civil and Military Aviation Study Area showing UK Visual Flight Rules (VFR) Aviation Chart 1:500,000 depicting Irish airspace structure.

7.11.2 Data sources

- 7.11.2.1 The following data sources will be used to inform the baseline conditions:
 - Integrated Aeronautical Information Package (IAIP) (Irish Aviation Authority, 2019); and
 - United Kingdom Civil Aviation Authority Visual Flight Rules Aviation Chart 1:500,000.
- 7.11.2.2 Information to inform the baseline has been drawn from a review of the data sources outlined above; in particular, the Irish IAIP.

7.11.3 Baseline environment

- 7.11.3.1 The baseline conditions are broadly similar to those considered in the 2001 EIS, although there have been changes to aviation regulations and guidelines and aviation organisations which will be taken into account. A desktop study has been undertaken to characterise existing baseline conditions in the vicinity of the Proposed Development.
- 7.11.3.2 A summary of the baseline environment for civil and military aviation is follows:
 - Airspace Structure (Figure 7.24): the Proposed Development is situated in an area of Class G uncontrolled airspace which is established from the surface up to 2,500 feet (ft) above mean sea level (amsl) in the northern portion of the Lease Area; and up to 4,500 ft in the remaining portion of the Lease Area. Above these altitudes, Class C controlled airspace is established up to Flight Level 245 (24,500 ft). Within these classifications of airspace, the following applies:
 - Class G Airspace: aircraft can operate in this area of uncontrolled airspace without any mandatory requirement to be in communication with or receive a radar service from an ATC unit. Pilots of aircraft operate under Visual Flight Rules (VFR) in Class G airspace and are ultimately responsible for seeing and avoiding other aircraft and obstacles; and
 - Class C Airspace: aircraft operating within Class C controlled airspace must be in receipt of an Air Traffic Service (ATS) from an appropriate ATC unit;
 - Military Aviation: the Department of Defence (DoD) has its primary airbase at Casement Aerodrome which is located at Baldonnel, County Dublin (Figure 7.24); this is home to the DoD's Air Corps. The Air Corps operates a fleet of fixed and rotary wing aircraft providing military support to the Army and Naval services, together with non-military tasks such as Garda air support, air ambulance, fisheries protection and the Ministerial Air Transport Service;
 - Civil Aviation: the Irish Aviation Authority (IAA) operates a PSR at Dublin Airport (Figure 7.24). Although the Proposed Development is outside the airport's statutory safeguarding area, it is technically within the operating range of the PSR;
 - Aerodromes: Newcastle Aerodrome, located near Greystones, 5 nautical miles (nm) north of Wicklow (Figure 7.24), is the nearest non-radar equipped licensed aerodrome to the Lease Area;
 - Search and Rescue (SAR): consultation has taken place with IAA and CHC Helicopters (the provider of SAR operations in Ireland) regarding any potential impact on SAR operations. Further consultation is planned as part of the EIA Scoping process. However, it is not expected that the Proposed Development will have any significant impacts on SAR operations;
 - Helicopter routes: there are no oil and gas platforms requiring helicopter access within 9 nm of the Lease Area;

7.11.4 Potential impacts

7.11.4.1 Table 7.19 presents the potential impacts on civil and military aviation receptors that could arise from the Proposed Development during the construction, operational and maintenance and decommissioning phases.

Table 7.19: Im	pacts to be sco	ped in for civi	I and military	vaviation.

Potential	Pha	se		Justification			
impact	С	0	D				
Creation of physical obstacles affecting air traffic	✓	•	×	 Construction and operational and maintenance phases Aircraft operating at low levels are required to set a Minimum Safe Altitude (MSA); this is the lowest altitude set in areas to ensure safe separation between aircraft and known obstacles. The MSA for aircraft operating in Instrument Meteorological Conditions (IMC), essentially poor weather, enables aircraft to maintain a minimum of 1,000 ft (305 m) clearance between aircraft and known obstacles. The PDE will include wind turbines with a maximum tip height of c. 197 m above Mean High Water (646 ft). Therefore, the MSA in the area of Arklow Bank will need to be 1,700 ft (646 ft + 1,000 ft rounded to the next 100 ft) in order to maintain at least 1,000 ft vertical separation between the wind turbines and aircraft. The potential impact on air traffic and associated mitigation measures will be assessed in the EIAR. 			
Interference with civil and military PSR systems	2	•	×	 Operational and maintenance phase Wind turbines have been shown to have detrimental effects on the performance of PSRs. These effects include the desensitisation of radar in the vicinity of the turbines, shadowing and the creation of unwanted returns which air traffic controllers must treat as aircraft returns. The desensitisation of radar could result in aircraft not being detected by the radar and therefore not presented to air traffic controllers. Controllers use the radar to separate and sequence aircraft; therefore, maintaining situational awareness of all aircraft movements within the airspace is crucial to achieving a safe and efficient ATS, and the integrity of radar data is central to this process. The creation of unwanted return, making the tracking of both conflicting unknown aircraft and the controllers' own traffic much more difficult. Given the distance of the Proposed Development from both Dublin Airport and Casement Aerodrome (Baldonnel) (approximately 30 nm), the impact on PSR systems is not expected to be significant. Initial consultation with the IAA and DoD has indicated this to be the case, and further consultation is planned as part of the EIA Scoping process. The potential impact on radar systems will be assessed in the EIAR. 			

7.11.5 Impacts scoped out of further assessment

Table 7.20 presents the potential impacts proposed to be scoped out of the Civil and Military Aviation EIAR chapter.

Table 7.20: Impacts to be scoped out of the Civil and Military Av	Aviation EIAR chapter.
-------------------------------------------------------------------	------------------------

Potential impact	Justification
Effects on aerodromes	 It is proposed that potential impacts on the Newcastle aerodrome during the construction, operational and maintenance and decommissioning phases are scoped out of the EIAR. Although technically outside the consultation zone, initial consultation with the owner of the aerodrome has indicated that the Proposed Development will not impact on Newcastle Aerodrome's operations. The Brittas Bay Aerodrome, 5 nm north of Arklow Town, is now disused and there are no plans for it to be re-established.

7.11.6 Proposed assessment methodology

- 7.11.6.1 The assessment will be carried out with reference to the following published guidance:
 - How to Assess the Potential Impact of Wind Turbines on Surveillance Sensors (Eurocontrol, 2014);
 - Irish Aviation Authority (Aerodrome Standards) Order 2008 (SI No 356 of 2008);
 - Irish Aviation Authority (Air Traffic Control Standards) Order 2004 (SI No 856 of 2004);
 - Irish Aviation Authority (En-Route Obstacles to Air Navigation) Order 1999 (SI No 423 of 1999);
 - Guidance Material on Off-Shore Wind Farms (Irish Aviation Authority, 2015);
 - European Guidance Material on Managing Building Restricted Areas (Irish Aviation Authority, 2015);
 - Land Use Planning and Offshore Development (Irish Aviation Authority, 2014);
 - Irish Aviation Authority (Obstacles to Aircraft in Flight) Order 2005 (SI No 215 of 2005); and
 - Irish Aviation Authority (Rules of the Air) Order 2004 (SI No 72 of 2004).
- 7.11.6.2 There is no published legislation or guidance to define how the significance of impacts on aviation receptors should be determined. These criteria will be derived using professional judgement and developed in consultation with the relevant aviation stakeholders.

7.11.7 Designed-in measures and mitigation

- 7.11.7.1 The following designed-in measures are proposed in relation to civil and military aviation:
 - The Developer will provide details of the Proposed Development to the IAA to enable the notification of the presence of the Proposed Development in appropriate aviation documentation and aviation charts; this will enable aviation operators to set an appropriate MSA over the Lease Area; and
 - As required by the IAA, the wind turbines will be fitted with appropriate aviation lighting in accordance with Aeronautical Services Advisory Memorandum (2015): Guidance Material on Off-shore Wind Farms. The specific lighting requirements will be discussed and agreed with the IAA once the final wind turbine layout is known.
- 7.11.7.2 Any further mitigation requirements for civil and military aviation will be dependent on the significance of the effects.

7.12 Seascape landscape and visual amenity

7.12.1.1 This chapter will consider the potential impacts of the Proposed Development on seascape, landscape and visual amenity during the construction, operational and maintenance and decommissioning phases.

7.12.1 Study area

7.12.1.1 The Seascape, Landscape and Visual Amenity Study Area (Figure 7.25) is initially defined as a 60 km radius around the Lease Area in line with referenced guidance (see section 7.11.6.1). The Seascape, Landscape and Visual Amenity Study Area and extent of baseline receptors to be considered in the assessment will be refined based on the findings of the Zone of Theoretical Visibility (ZTV).



Document Name: EOR0765_SCO_024_01_SeascapeLandscape_StudyArea_200915

Figure 7.25: Initial Seascape, Landscape and Visual Amenity Study Area.

7.12.2 Data sources

- 7.12.2.1 The baseline data sources in respect of seascape and landscape are as follows:
 - Landscape Character Assessment for County Wicklow, Wicklow County Development Plan 2016-2022;
 - Landscape designations, Wicklow County Development Plan 2016-2022;
 - Seascape Character Assessment, Appendix A of the SEA of the ODREP, Republic of Ireland;
 - Landscape Character Assessment for County Wexford, Wexford County Development Plan 2013-2019;
 - Landscape Designations, Wexford County Development Plan 2013-2019;
 - National Inventory for Architectural Heritage (NIAH) of designed landscapes, Department of Culture, Heritage and the Gaeltacht website;
 - Recorded visibility data, Met Eireann;
 - Data used to inform the 2001 EIS, updated where required; and
 - Baseline landscape character and landscape designations for Counties Kildare and Carlow where applicable.

7.12.3 Baseline environment

- 7.12.3.1 The Seascape, Landscape and Visual Amenity Study Area comprises the coastline and landscapes of Wicklow, Wexford and Dublin and the Irish Sea together with inland landscapes further west. The coastal landscapes are overlooked inland by the Wicklow Mountains and isolated peaks in Wexford and Carlow including Mount Leinster and part of the Bluestack Range. The Seascape, Landscape and Visual Amenity Study Area features large bays associated with Dublin and Wexford. The ABWP Phase 1 wind turbines are located approximately 11.5 km off the coast of Arklow Town. The baseline includes the AWBP Phase 1 wind turbines.
- 7.12.3.2 The baseline visual amenity will focus on views from a range of viewpoint locations representing a range of viewer types. The main viewer types likely to be affected by the Proposed Development include:
 - Residents of settlements and individual dwellings;
 - Visitors staying or travelling through the area;
 - Recreational visitors whose attention is focussed on the landscape;
 - Recreational users of the marine environment; and
 - People travelling along road and rail routes.
- 7.12.3.3 The baseline visual amenity will consider viewpoints documented in the assessment prepared for the 2001 EIS as follows:
 - VRP 1: Old Lighthouse at Wicklow Head, Co. Wicklow;
 - VRP 2: Blainroe Golf Club, Co. Wicklow;
 - VRP 3: Third Class Road at Ballynacarrig/Castletimon, Co. Wicklow;

- VRP 4: Public House Car Park at Ballynacarrig, Co. Wicklow;
- VRP 5: Beach at Brittas Bay, Co. Wicklow;
- VRP 6: Third Class Road at Tonlegee, Co. Wicklow;
- VRP 7: Third Class Road at Ballinvalley Upper, Co. Wicklow;
- VRP 8: Third Class Road at Ballinaskea, Co. Wicklow;
- VRP 9: N11 National Road at Johnstown South, Co. Wicklow;
- VRP 10: Amenity Area at Ferry Bank, Arklow, Co. Wicklow;
- VRP 11: Arklow Town, Co. Wicklow;
- VRP 12: Third Class Road at Moneyribbin, Wicklow- Wexford Border;
- VRP 13: Amenity Car Park at Clogga, Co. Wicklow;
- VRP 14: Beach at Kilmichael, Co. Wexford;
- VRP 15: Beach at Clones, Co. Wexford;
- VRP 16: Third Class Road at Tara Hill, Co. Wexford;
- VRP 17: Beach at Ballymoney Lower, Co. Wexford;
- VRP 18: Beach at Courtown Harbour, Co. Wexford; and
- VRP 19: The Irish Sea East of the Arklow Bank.
- 7.12.3.4 The following additional viewpoints will be included in the visual impact assessment:
 - VRP 20: Cahore Point, Wexford;
 - VRP 21 Curracloe Beach, Wexford;
 - VRP 22: Minor Road Barnacleagh East;
 - VRP 23: Coast Road, Johnstown South;
 - VRP 24: Minor Road, Kileagh;
 - VRP 25: Mizen Head
 - VRP 26: Newcastle.
 - VRP 27: Summit of Scarr, Wicklow Mountains
 - VRP 28: Tara Hill
 - VRP 29: Bray to Greystones Cliff Walk
 - VRP30: Sorrento Park

7.12.4 Potential impacts

7.12.4.1 Table 7.21 presents the potential impacts on seascape, landscape and visual amenity that could arise from the Proposed Development during the construction, operational and maintenance and decommissioning phases.

Table 7.21: Impacts to be scoped in for the Seascape, Landscape and Visual Amenity EIAR chapter.

Potential	Phase			Justification					
impact	С	0	D						
Temporary change to seascape, landscape and visual amenity	*	×	•	 Construction and decommissioning phases The installation and decommissioning of infrastructure will involve a range of activities which will result in effects on seascape, landscape and visual amenity, including presence of vessels and equipment within the Lease Area and along the offshore export cable routes, presence of vessels travelling to and from the Lease Area and the offshore export cable routes, and installation of foundations, wind turbines and OSPs within the Lease Area. The activities and elements listed above are the main features of the construction and decommissioning phases which will be apparent from the surrounding area of sea, the 					
				 coastline and the landscapes of Wicklow and Wexford primarily. The activities and elements will be seen by viewers as a series of intermittent activities in accordance with the required construction and decommissioning sequences. These activities will be temporarily visible in views to be considered in the visual impact assessment. 					
Change to seascape, landscape and visual amenity	×	•	×	 Operational and maintenance phase The presence of offshore wind turbines, OSPs and related navigational lighting, and the presence of intermittent sea traffic to facilitate maintenance operations, will result in effects on seascape, landscape and visual amenity. The assessment will consider effects upon: Seascape character and resources, including effects on the physical and aesthetic value of the coastal and marine seascape caused by changes in elements and qualities as a result of the offshore wind turbines and OSPs; Landscape character and resources, including effects on the physical and aesthetic value of the landscape character areas caused by changes in elements and qualities as a result of the offshore wind turbines and OSPs; Designated landscapes, including effects on the particular characteristics of designated areas, as a result of the offshore wind turbines and OSPs; and Visual amenity, including effects upon viewing groups (e.g. residents, visitors, tourists), caused by changes in the appearance of the landscape and/or seascape as a result of the offshore wind turbines and OSPs. 					

7.12.5 Impacts scoped out of further assessment

7.12.5.1 No potential impacts are proposed to be scoped out of the EIAR with regards to seascape, landscape and visual amenity.

7.12.6 Proposed assessment methodology

- 7.12.6.1 The assessment approach and methodology will be informed by published guidance as follows:
 - Landscape Institute and Institute of Environmental management and Assessment, Guidelines for Landscape and Visual Impact Assessment, 3rd Edition, (2013);
 - Scottish Natural Heritage, Offshore Renewables Guidance on assessing the impact on coastal landscape and seascape, Guidance for Scoping an Environmental Statement (2012);
 - Scottish Natural Heritage, Visual Representation of Wind Farms Guidance (2017);
 - Scottish Natural Heritage, Siting and Designing Wind Farms in the Landscape (2017);

- DCCAE, Guidance on EIS and NIS Preparation for Offshore Renewable Energy Projects (2017); and
- Department of the Environment, Heritage and Local Government, Draft Planning Guidelines (wind energy), (2006).
- 7.12.6.2 The assessment of effects on seascape and landscape resources and assessment of effects on visual amenity are separate but interconnected. Established guidance, referenced above, makes a distinction between landscape effects and visual effects.
- 7.12.6.3 Seascape and landscape receptors include physical elements, features and characteristics that may be affected by the Proposed Development. Visual receptors include the public or community at large and residents and visitors to the area.
- 7.12.6.4 The assessment will involve the following key steps:
 - The maximum design scenario will be identified, and the Seascape, Landscape and Visual Amenity Study Area will be confirmed;
 - A ZTV of the proposed offshore wind turbines will be generated covering the Seascape, Landscape and Visual Amenity Study Area defined for the assessment;
 - The seascape and landscape baseline within the ZTV will be identified and documented with reference to published landscape character assessments and seascape character assessments;
 - Designated landscapes and landscape features (historic gardens and designed landscapes) near the coast will be identified and described;
 - The visual baseline will be recorded with reference to the viewpoints considered in the 2001 EIS, as listed above. Detail on these viewpoints will be presented including a description of existing views and the different groups of people who experience these views;
 - Use of photography captured in 2020 ;
 - Visualisations (wirelines and photomontages) will be generated based on 3D modelling of the offshore wind turbines and OSPs; and
 - An assessment of potentially significant effects will be undertaken as follows:
 - seascape and landscape character;
 - designated landscapes and landscape features; and
 - viewers at selected viewpoint locations,
- 7.12.6.5 The assessment will be supported by figures illustrating the baseline seascape, landscape and viewpoint locations and ZTV together with photomontages prepared to technical standards detailed in the guidance.

7.12.7 Designed-in measures and mitigation

- 7.12.7.1 The following designed-in measures are proposed in relation to seascape, landscape and visual amenity:
 - Reduction in adverse aesthetic effects of the wind turbine layout achieved through wind farm design.

7.12.7.2 Any further mitigation requirements to be adopted for seascape, landscape and visual amenity will be dependent on the significance of the effects.

7.13 Marine Archaeology

7.13.1.1 This chapter will consider the potential impacts of the Proposed Development on marine archaeology during the construction, operational and maintenance and decommissioning phases.

7.13.2 Study area

7.13.2.1 The Marine Archaeology Study Area is focused on the footprint of the Lease Area and the offshore export cable routes, including the intertidal zone at the landfall location, extending to the area within one tidal excursion of the Lease Area, which extends approximately 20 km north and 20 km south of the bank.

7.13.3 Data sources

- 7.13.3.1 Baseline conditions will be informed by the following:
 - Inspection of National Sites and Monument Records;
 - Inspection of the relevant files of the National Museum of Ireland;
 - Inspection of the National Historic Shipwreck Inventory;
 - Available online databases;
 - Review of desktop studies conducted for the Proposed Development;
 - Inspection of relevant geophysical survey reports;
 - Inspection of relevant site inspection reports; and
 - Review of site-specific marine geophysical survey data collected in 2019 and associated reports.

7.13.4 Baseline environment

- 7.13.4.1 Arklow Bank is one of a series of sandbanks that run along the east coast from Dublin to Wexford and is situated geographically in an area known as the Irish Platform, which occupies a 20 km to 30 km wide corridor off Ireland's east coast. The surface sediment on Arklow Bank is mobile, formed due to reworking following relative sea level rise post-10,000 BP (Before Present, i.e. 1950). Areas around the bank are also characterised by mobile sand overlaying glacial clay. There is no indication in the data gathered to date for significant potential associated with palaeo-landscapes being exposed on Arklow Bank.
- 7.13.4.2 Arklow Bank has been hazardous to shipping, with 165 historic wrecking events associated with the bank and in the waters close to it. This includes 116 recorded wreckings of unknown specific location, as well as 49 known wreck site and potential wreck site locations, which have been identified through previous marine geophysical and related site surveys. In contrast, within the wider Marine Archaeology Study Area that extends approximately 20 km north and 20 km south of the bank, there are only 11 known wreck sites in the sea area to the north of the bank, and 7 wreck sites in the sea area to the south (Figure 7.26).
- 16.1.5.3 The wreckings have been recorded systematically since *c*. 1750 AD, and generally occurred during the winter and early spring, with the majority between November and March/April. This is in keeping with expectations for such events to occur during the seasonally foul weather. In nine cases, wind direction was recorded. It appears that storm conditions during prevailing south westerly winds accounted for six wreckings; north-easterlies for two wreckings; while an east south

easterly summertime storm resulted in the wrecking of one vessel. The Irish Sea is particularly treacherous during a north easterly/easterly and the low numbers of wreckings recorded in such conditions suggests that most captains knew when to seek shelter and had sufficient advance warning to do so. The wreckings that occurred during south westerlies suggests that despite efforts to hug the coastline inshore, there were many occasions when vessels trying to navigate harsh conditions were blown onto the bank.

- 16.1.5.4 Site-specific marine geophysical surveys were completed in 2019. These surveys recorded 24 wreck sites and potential wreck sites within the Lease Area, some of which had been identified previously and some of which were newly identified. In addition, three possible unexploded ordnance targets were identified, four possible fishing gear targets, over 1,200 debris targets and more than 5,000 boulder targets.
- 16.1.5.5 Archaeological review of the 2019 dataset concurred with the principal observations outlined above and identified seven additional potential wreck sites. There is close correlation between four historic wreck site locations and four of the sites recorded in the 2019 dataset. There is also a correlation in nine other instances between historic wreck site locations and targets recorded in 2019. The total number of wreck sites and potential wreck sites associated with the Arklow Bank currently stands at 74.
- 16.1.5.6 Wreck sites and potential wreck sites identified in previous surveys were not all observed in the 2019 survey, while the 2019 survey identified new sites in areas surveyed previously. This speaks to the dynamic environment of Arklow Bank, where shifting sands will routinely expose and alternatively bury sites of archaeological interest. The record as reported in the 2019 survey will be used for the purposes of the EIAR, with this record considered to be very robust and comprehensive.
- 16.1.5.7 The distribution of historic wrecks on Arklow Bank and that of the sites recorded in 2019 suggest that wreckings are focused in particular locations on the bank (Figure 7.27). There are more wreck sites recorded on the west side of the bank than on its eastern side. This accords with the pattern of historic wreckings as recorded in contemporary sources, where more vessels appear to have been lost during prevailing south westerly storms than on other occasions.
- 16.1.5.8 Desktop review indicates the presence of no known cultural heritage features on the foreshore at the landfall locations.



Figure 7.26: Distribution of known historic wreck sites and potential wreck sites on Arklow Bank and in the adjacent sea area.



Figure 7.27: Distribution of wreck sites and potential wreck sites, 2020.

7.13.5 Potential impacts

7.13.5.1 Table 7.22 presents the potential impacts on marine archaeology that could arise from the Proposed Development during the construction, operational and maintenance and decommissioning phases.

Table	7 22 [.] Im	nacts to	he scone	d in f	for the	Marine		FIAR cha	nter
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Potential	Pha	ase		Justification				
impact	С	0	D					
Sediment disturbance and deposition leading to effects on known heritage assets	~	1	*	 Construction and decommissioning phases Construction works, including seabed preparation, installation of foundations, and cable installation, may cause seabed disturbance and associated deposition, which could lead to effects on known heritage assets. The extent of these effects will be considered in the Coastal Processes Chapter of the EIAR, subsequently informing any potential construction effects on heritage assets. Effects from decommissioning are likely to be similar to effects from construction. Operational and maintenance phase Maintenance operations, including cable repair activities, may cause seabed disturbance and associated deposition, which could lead to effects on known heritage assets. The extent of these effects will be considered in the Coastal Processes Chapter of the EIAR, subsequently informing any potential processes cause and associated deposition, which could lead to effects on known heritage assets. The extent of these effects will be considered in the Coastal Processes Chapter of the EIAR, subsequently informing any potential operational effects on the EIAR, subsequently informing any potential operational effects on heritage assets. 				
Direct damage to known heritage assets	~	~	~	 Construction and decommissioning phases Construction works could directly affect any shipwrecks present within the Lease Area and along the offshore export cable routes. These effects will likely be localised, but should they occur, they could lead to adverse and irreversible damage to known heritage assets. Where asset locations are already known, measures adopted as part of the Proposed Development for their avoidance and protection include the micro-siting of infrastructure to avoid any known archaeological constraints identified in pre-construction surveys. Effects from decommissioning are likely to be similar to effects from construction. 				
				 Maintenance operations could directly affect any shipwrecks present within the Lease Area and along the offshore export cable routes. These effects will likely be localised, but should they occur, they could lead to adverse and irreversible damage to known heritage assets. Where asset locations are already known, measures adopted as part of the Proposed Development include avoidance of any known archaeological constraints identified in pre-construction surveys. 				
Alteration of sediment transport regimes	×	✓	×	 Operational and maintenance phase The physical presence of wind turbine and OSP foundations and any scour/cable protection may lead to localised changes in tide and wave climate, affecting the distribution of sediment, which could be directed towards or away from known heritage assets, causing damage. The extent of these effects will be considered in the Coastal Processes Chapter of the EIAR, subsequently informing any potential operational effects on heritage assets. 				

7.13.6 Impacts scoped out of further assessment

7.13.6.1 No potential impacts are proposed to be scoped out of the EIAR with regards to marine archaeology.

7.13.7 Proposed assessment methodology

7.13.7.1 The EIAR will consider the potential impacts of the construction, operational and maintenance and decommissioning phases of the Proposed Development within the Marine Archaeology Study Area. The assessment will follow the methodology identified in section 6, and will be conducted in line with the following legislative procedures and guidelines:

- The National Monuments Act (1930-2004);
- The Foreshore Act (1933);
- Merchant Shipping Act (1995);
- European Convention on the Protection of the Archaeological Heritage (Valetta Convention);
- Department of Arts, Heritage, Gaeltacht and the Islands (DAHGI) Framework and Principles for the Protection of the Archaeological Heritage (1999);
- DAHGI Policy and Guidelines on Archaeological Excavation (1999);
- COWRIE Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy (2007) quoted in Department of Communications, Climate Action & Environment Guidance on EIS and NIS Preparation for Offshore Renewable Energy Projects (2017);
- International Council on Monuments and Sites (ICOMOS) guidance, non-governmental international organisation dedicated to the conservation of the world's monuments and sites; and
- United Nations Educational, Scientific and Cultural Organization (UNESCO) guidance, who seeks to encourage the identification, protection and preservation of cultural and natural heritage around the world considered to be of outstanding value to humanity.
- 7.13.7.2 The assessment will be informed by the Coastal Processes chapter of the EIAR, which will rely on numerical modelling to represent the potential impacts of the Proposed Development (see section 7.2).

7.13.8 Designed-in measures and mitigation

- 7.13.8.1 The following designed-in measures are proposed in relation to marine archaeology:
 - Implementation of Archaeological Exclusion Zones (AEZs) around known heritage assets. The extent of these would vary depending upon the size of the wreck identified and would be agreed in consultation with the Department of Culture, Heritage and the Gaeltacht as the development design progresses, and additional information becomes available; and
 - Implementation of a Protocol for Archaeological Discoveries or similar, setting out the principles and management actions for unexpected archaeological discoveries made during the course of development.
- 7.13.8.2 Any further mitigation requirements for marine archaeology will be dependent on the significance of the effects.

7.14 Infrastructure and other users (material assets)

7.14.1.1 This chapter will consider the potential impacts of the Proposed Development on infrastructure and other users during the construction, operational and maintenance and decommissioning phases.

7.14.2 Study area

7.14.2.1 The Infrastructure and Other Users Study Area is shown in Figure 7.26. This includes the Lease Area and offshore export cable routes as well as all infrastructure and other users receptors within an area which has the potential to be affected by the Proposed Development up to the High Water Mark (HWM).

- 7.14.2.2 The Infrastructure and Other Users Study Area varies in scale depending on the particular receptor and has been divided into different areas according to each receptor, as listed below:
 - Infrastructure and Other Users Study Area Inner Area (within 1 km of the Lease Area and the northern and southern offshore export cable routes): This area includes the extent of potential direct physical overlap between the Proposed Development activities and the following receptors (if identified):
 - Recreational receptors (including receptors carrying out fishing, sailing and motor cruising; kite surfing; surfing; windsurfing; kayaking and canoeing; and beach users);
 - Offshore energy projects (e.g. offshore wind farms, oil and gas projects, carbon capture and storage, natural gas storage and underground coal gasification);
 - Cable and pipeline operators;
 - Port activities and dredging areas;
 - Aggregate resource areas and coal deposits; and
 - Communications infrastructure (microwave, Very High Frequency (VHF) and Ultra-High Frequency (UHF) links).
 - Infrastructure and Other Users Study Area Outer Area: This area is based on one tidal excursion from the boundary of the Lease Area (see section 7.2.1) to consider impacts on the following receptors:
 - Aggregate extraction and marine disposal sites; and
 - Recreational receptors (diving sites).
 - Infrastructure and Other Users Study Area Other Communications Infrastructure: This area will be confirmed following identification of other communications infrastructure receptors which could potentially be affected by the Proposed Development, such as television transmitters.



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Figure 7.28: Infrastructure and Other Users Study Area.

7.14.3 Data sources

7.14.3.1 The baseline environment for the Infrastructure and Other Users Study Area (Inner Area and Outer Area) will be identified through a detailed desktop review. Table 7.22 provides a summary of the data sources that will be used to inform baseline. Other data and information sources may be identified during the review as part of the EIA.

Table 7.23: Summary of infrastructure and other users data sources.

Title	Source	Year	Author
Human Activities – Webmap Service:Dredge Spoil Dumping.	EMODnet	Compiles a series of data	N/A
Ireland's Marine Atlas – Webmap Service: • Offshore Wind Farms; • Cables; • Pipelines; • Oil and Gas infrastructure; and • Wrecks.	Marine Institute	Compiles a series of data	N/A
Marine Irish Digital Atlas – Webmap Service: Diving and Sub-aqua Clubs; Fishing Spots; Surf Spots; Marines and Pontoons; and ISA Sailing Clubs.	International Coastal Atlas Network	Compiles a series of data	N/A
 Northern Ireland Marine Mapviewer – Webmap Service: Dredging; Cable and pipelines; and Oil and Gas infrastructure. 	Department of Agriculture, Environment and Rural Affairs	Compiles a series of data	N/A
Webmap service: • Offshore Wind Farms.	C4Offshore	Compiles a series of data	N/A
Possibilities for commercial mineral deposits in the Irish Offshore Area	Marine Mining	1989	Geoghegan, Gardiner and Keary
Feasibility study on the establishment of a large-scale inshore resource mapping project	Marine Institute	2004	Parsons <i>et al.</i>
A Guide to Sea Angling in the Eastern Fisheries Region by Norman Dunlop	Eastern Regional Fisheries Board	2009	Eastern Regional Fisheries Board
A Coastal Atlas of Recreational Boating in Ireland	Irish Cruising Club	2018	Irish Cruising Club with support of Irish Sailing
Oil and Gas - Concession Map	DCCAE	2019	DCCAE
Oil and Gas (Exploration & Production)	DCCAE	2019	DCCAE
Material Assets:Carbon Capture and Storage;Marine Aggregates; andEnergy.	National Marine Planning Framework SEA Environmental Report	2019	Department of Housing, Planning and Local Government
 Petroleum Activity and Authorisations; Marine Renewable Energy and Infrastructure; High Potential Marine Aggregate Resource; and 	National Marine Planning Framework Consultation Draft	2019	Department of Housing, Planning and Local Government

Title	Source	Year	Author
 Sport and Recreation Trends and Features. 			

7.14.3.2 Consultation will be carried out to inform the communications infrastructure baseline (satellite communication, VHF radio, UHF communication, offshore microwave fixed links and television).

7.14.4 Baseline environment

Recreational activities

Sailing, boating and motor cruising

- 7.14.4.1 The Infrastructure and Other Users Study Area Inner Area overlaps with a general sailing area associated with Arklow Sailing Club. A sailing area to the northwest of the Lease Area was also identified (Figure 7.28). General sailing areas are used for general day-to-day use by all recreational boating users, including dinghies, sailboards, watercraft and small cruisers.
- 7.14.4.2 There are no racing areas in the Infrastructure and Other Users Study Area Inner Area, however a racing area is located to the north of the Lease Area associated with the Arklow Sailing Club.
- 7.14.4.3 Medium use recreational boating routes run perpendicular to the coastline and cross the offshore export cable routes close to the coast. A medium use boating route also crosses the southern end of the Lease Area, which leads to other light and medium traffic routes.

Recreational fishing

7.14.4.4 Recreational shore angling marks have been identified within the Infrastructure and Other User Study Area – Inner Area at the Northern Landfall (Figure 7.28). There are a number of wrecks within the Infrastructure and Other User Study Area – Inner Area (Figure 7.28), which may offer suitable offshore recreational fishing marks, although this will be confirmed through the detailed baseline characterisation presented in the EIAR.

Recreational diving

7.14.4.5 No diving locations have been identified. However, there are a number of wrecks within the Infrastructure and Other User Study Area – Outer Area (Figure 7.28), which may offer diving locations, although this will be confirmed through the detailed baseline characterisation presented in the EIAR.

Surfing

7.14.4.6 No surfing locations were identified within the Infrastructure and Other Users Study Area – Inner Area, however there are two surfing locations to the north of the Northern Landfall (Figure 7.28).

Harbours, marinas and dredging areas

- 7.14.4.7 Arklow Harbour is located within the Infrastructure and Other Users Study Area Outer Area (Figure 7.28). Ongoing maintenance dredging would be required within the port berth areas and vessel approaches to maintain sufficient draught for vessel access. No offshore dredge disposal grounds associated with dredging of the port were identified within the Infrastructure and Other Users Study Area Outer Area, and this will be confirmed through the detailed baseline characterisation presented in the EIAR.
- 7.14.4.8 A Dumping at Sea Permit is currently valid for a period of eight years from 20/01/2017 for bed levelling activities associated with ABWP Phase 1. The permit allows for levelling of 99,999 wet tonnes of material using a sea plough to remove areas of sand accretion restricting access for maintenance vessels around ABWP Phase 1. The area permitted for bed levelling is provided in Figure 7.28.

Aggregate resource areas and coal deposits

- 7.14.4.9 Potential aggregate resource areas have been identified within the Infrastructure and Other User Study Area – Outer Area, however no licences have yet been granted for aggregate extraction (Figure 7.28).
- 7.14.4.10 There are no known coal deposits located within the Infrastructure and Other Users Study Area Inner Area.

Offshore energy projects

- 7.14.4.11 ABWP Phase 1 is located within the Infrastructure and Other Users Study Area Inner Area. It comprises 3.6 MW turbines with capacity of 27.2 MW within an area occupying approximately 1.35 km² within the Lease Area. A single export cable route extends from the existing wind turbines to shore via landfall at Arklow Harbour. The length of the cable is approximately 15.5 km from the Lease Area to landfall (Figure 7.28). The existing ABWP Phase 1 export cable will be crossed by cables associated with the Proposed Development, specifically offshore export cable route 2 and inter-array cables to the west of Arklow Bank.
- 7.14.4.12 There are no other consented or operational offshore wind farms or wave and tidal energy developments within the Infrastructure and Other Users Study Area Inner Area.
- 7.14.4.13 There are no active or proposed Carbon Capture and Storage, natural gas storage or Underground Coal Gasification sites within the Infrastructure and Other Users Study Area – Inner Area.

Offshore interconnector, telecommunication cables and pipelines

7.14.4.14 There are no active interconnector or telecommunication cables or pipelines within the Infrastructure and Other Users Study Area – Inner Area. There is one operational subsea telecommunication cable located offshore of Arklow Bank beyond the 12 nm limit (Figure 7.28). There are two offshore gas pipelines that connect Ireland with Scotland located to the north of Dublin Bay (Figure 7.28).

Communications infrastructure

7.14.4.15 Communications infrastructure to be considered within this chapter will include satellite communication, VHF radio, UHF communication, offshore microwave fixed links and television. Communications receptors in the vicinity of the Proposed Development will be identified through consultation.

7.14.5 Potential impacts

7.14.5.1 Table 7.23 presents the potential impacts on infrastructure and other users that could arise from the Proposed Development during the construction, operational and maintenance and decommissioning phases.

Potential impact	Phase			Justification	
	С	0	D		
Potential for damage to ABWP Phase 1 export cables	1	1	~	 All phases The installation, presence and decommissioning of infrastructure within the Lease Area and offshore export cable routes, including cable crossings, may damage the ABWP Phase 1 export cable. 	
Restriction of access to ABWP Phase 1 for	~	~	1	 All phases The installation, presence and decommissioning of infrastructure within the Lease Area and offshore export cable routes, including cable crossings, may 	

Table 7.24: Impacts to be scoped in for the Infrastructure and Other Users EIAR chapter.

Potential impact	t Phase			Justification		
	С	0	D			
maintenance activities				restrict access to ABWP Phase 1 wind turbines and export cable for maintenance.		
Impact on cables	×	1	x	Operational and maintenance phase		
from scour and sediment mobilisation				 Indirect impacts on the ABWP Phase 1 export cable may arise as a result of the physical impacts upon marine processes arising from the Proposed Development resulting in scour and sediment mobilisation. 		
Displacement of	1	✓	~	All phases		
recreational activities				• The installation, presence and decommissioning of infrastructure within the Lease Area and offshore export cable routes may displace recreational activities from any areas subject to activities associated with the Proposed Development, resulting in a loss of recreational resource.		
Increased	✓	✓	√	All phases		
suspended sediment concentrations and associated deposition				 There is potential for increased suspended sediment concentrations and associated deposition arising from installation, maintenance and decommissioning activities affecting recreational diving sites (if identified) within the Infrastructure and Other Users Study Area – Outer Area. 		
Increased airborne	1	×	~	Construction and decommissioning phases		
noise				 Potential for airborne noise during construction and decommissioning phases to interfere with recreational sailing and motor cruising, recreational fishing and other recreational activities. 		
Restrictions to port	✓	✓	1	All phases		
activities and users				• The installation, presence and decommissioning of offshore export cable route 3 may impact on Arklow Harbour activities, including vessel movements and dredging activities.		
Restrictions to	x	1	×	Operational and maintenance phase		
potential aggregate resource availability				 Potential impact on high potential aggregate resource area from presence of infrastructure, restricting future access. 		
Impact on	×	1	×	Operational and maintenance phase		
communications infrastructure				 The presence and operation of the offshore wind turbines may affect communications infrastructure (such as satellite communication, VHF radio, UHF communication, offshore microwave fixed links and television signals). 		

7.14.6 Impacts scoped out of further assessment

7.14.6.1 Table 7.24 presents the impacts to be scoped out of the Infrastructure and Other Users EIAR chapter.

Table 7.25: Impacts to be scoped out of the Infrastructure and Other Users EIAR chapter.

Potential impact	Justification
Changes to wave climate	Potential for changes to wave climate affecting the surfing waves and surf breaks recreational resource has been scoped out from further assessment due to the distance of the Lease Area from the shoreline (6 km) and as effects are unlikely to be measurable at the shoreline.

7.14.7 Proposed assessment methodology

7.14.7.1 The following guidance documents will be considered to inform the impact assessment on infrastructure and other users:

- European Boating Association (EBA) Position Statement, Offshore Wind Farms (EBA, 2019);
- Assessment of Impact of Offshore Wind Energy Structures on the Marine Environment (Marine Institute, 2000);
- International Cable Protection Committee (ICPC) Recommendations (ICPC, 2019);
- Guidance on Environmental Impact Assessment of Offshore Renewable Energy Development on Surfing Resources and Recreation (SAS, 2009); and
- Guidelines on the Treatment of Tourism in an Environmental Impact Statement (Fáilte Ireland, 2011).
- 7.14.7.2 The assessment methodology will follow that identified in section 6.5

7.14.8 Designed-in measures and mitigation

- 7.14.8.1 The following designed-in measures are proposed in relation to infrastructure and other users:
 - Advisory safety zones of up to 500 m in radius around individual structures undergoing installation, maintenance or decommissioning; Advisory safety zones of 50 m for incomplete structures at which construction activity may be temporarily paused;
 - Advisory clearance distances of up to 500 m in radius around cable installation vessels and cable repair vessels;
 - Promulgation of information advising on the nature, timing and location of activities, including through Notices to Mariners. Information and notices will also be posted at the landfall location;
 - The creation of a database of known users (including ABWP Phase 1 operator (GE Wind Energy), yacht clubs and local recreational activity centres) to act as a mailing list for direct issue of Notices to Mariners;
 - Navigational aids and marine charting; and
 - The use of guard vessels during installation and major maintenance activities.
- 7.14.8.2 Any further mitigation requirements for infrastructure and other users will be dependent on the significance of the effects.

7.15 Air quality and climate

7.15.1.1 This EIAR chapter will consider the potential impacts of the Proposed Development on climate during the construction, operational and maintenance and decommissioning phases. It is proposed that impacts on air quality are scoped out of the EIAR, as discussed below. However, an assessment of indirect positive impacts in the reduction of emissions of Greenhouse Gases (GHG) will be provided.

7.15.1 Study area

7.15.1.1 The study area for the assessment of the Proposed Development on climate is the Republic of Ireland.

7.15.2 Data sources

- 7.15.2.1 The baseline conditions will be identified through a detailed desktop review of EPA data on total national emissions of GHG in Ireland including the EPA (2019) Ireland's Final Greenhouse Gas emissions 1990-2017. Other data and information sources may be identified during the review as part of the EIAR.
- 7.15.2.2 Details on materials for the assessment of GHG emissions from construction of the Proposed Development will be sought from the design team during the assessment.

7.15.3 Baseline environment

- 7.15.3.1 In 2018, the EPA reported that total national emissions of GHG in Ireland are estimated to be 60.51 million tonnes carbon dioxide equivalent (Mt CO_{2eq}), 0.2% higher (0.14 Mt CO_{2eq}) than emissions in 2017, and 9.2% higher than 1990 national total. The total for 2018 is 21.4% lower than the peak of 70,555 Mt CO_{2eq} in 2001 when emissions reached a maximum following a period of unprecedented economic growth.
- 7.15.3.2 In 2018, the Energy Industries sector was the third largest individual contributor of GHG emissions at 17.1%, which is a decrease on emissions from the sector in 1990, when this sector represented 20.4% of total GHG emissions.
- 7.15.3.3 Public electricity and heat production accounts for 9.823 Mt CO_{2eq} of the total 10.364 Mt CO_{2eq} for this sector in 2018. The sector has experienced a 11.7% (1.38 Mt CO_{2eq}) decrease from 2017, when total emissions for this sector was 11.744 Mt CO_{2eq}. This change can be attributed to a 44% decrease in coal used in electricity generation (at Moneypoint) and an increase of 13.6% for electricity generated from wind.
- 7.15.3.4 The EPA estimate emissions to 2040 using two scenarios as follows:
 - 'With Existing Measures' scenario assumes that no additional policies and measures, beyond those already in place by the end of 2018 (latest EPA GHG Emissions Projections Report), are implemented; and
 - 'With Additional Measures' scenario assumes implementation of the 'With Existing Measures' scenario in addition to progressing of renewable and energy efficient targets for 2020.
- 7.15.3.5 GHG projections published by the EPA for 2018 to 2040, project that 'With Existing Measures', emissions in the Energy Industries sector are projected to increase by 5% to 12.3 Mt CO_{2eq} between 2018 and 2020 and by 31% between 2018 and 2030 (15.4 Mt CO_{2eq}). The 'With Existing Measures' scenario projects that by 2020, 39% of electricity generated comes from renewable sources and in 2030 it is estimated that renewable energy generation represents 41% of electricity consumption, with renewable electricity generation capacity dominated by wind.
- 7.15.3.6 'With Additional Measures', emissions from the Energy Industries sector are projected to increase by 2% by 2020 (to 11.9 Mt CO_{2eq}), however, this is projected to decrease by 27% (to 8.6 Mt CO_{2eq}) in the period between 2018 to 2030. The 'With Additional Measures' scenario assumes that by 2020 that there is a 39% share of renewable energy in electricity generation and for 2030 it is estimated that renewable energy generation represents 54% of electricity consumption.
- 7.15.3.7 Overall, total national GHG emissions are projected to increase from current levels by 1% and 6% by 2020 and 2030 respectively under the 'With Existing Measures' scenario. Total national GHG emissions under the 'With Additional Measures' scenario is estimated to decrease by 0.4% and 10% by 2020 and 2030 respectively.

7.15.4 Potential impacts

7.15.4.1 Table 7.26 presents the potential impacts on climate that could arise from the Proposed Development during the construction, operational and maintenance and decommissioning phases.

Table 7.26: Impacts to be scoped in for the Climate EIAR chapter.

Potential impact	Phase			Justification	
	С	Ο	D		
Direct and indirect emissions of greenhouse gases (GHG)	1	~	~	 All phases There is potential for both direct and indirect emissions of greenhouse gases (GHG) from the construction, operation and decommissioning of the Proposed Development. 	
Indirect positive impacts in the reduction of emissions of GHG from the national grid	1	×	1	 Operational and maintenance phase There is potential for indirect positive impacts in the reduction of emissions of GHG from the national grid from the operation of the Proposed Development. 	

7.15.5 Impacts scoped out of further assessment

7.15.5.1 Table 7.27 presents the impacts to be scoped out of the Climate EIAR chapter.

Table 7.27: Impacts to be scoped out of the Climate EIAR chapter.

Potential impact	Justification
Potential effects on air quality from dust and emissions	The assessment of potential impacts on air quality typically addresses the potential for impacts from dust and traffic/plant emissions on nearby sensitive receptors. As the Proposed Development relates to the construction of offshore infrastructure only there is no potential for dust impacts. Furthermore, due to the distance between the Lease Area and the shore (6 km), any potential impacts that might arise from emissions associated with plant or marine vessels are unlikely to give rise to likely significant effects due to the dispersal of emissions. There is unlikely to be potential for significant air quality impacts during the operational and maintenance or decommissioning phases of the Proposed Development. Therefore, the assessment of potential effects on air quality are not included in the scope of the EIAR.

7.15.6 Proposed assessment methodology

- 7.15.6.1 Consideration will be given to specific measures associated with the Proposed Development and the greenhouse gas emissions that may arise during the construction phase. Emissions of GHG may arise from the following sources:
 - Embodied emissions in site materials relative to other materials;
 - Direct emissions from plant machinery/equipment; and
 - Transport emissions from vehicles and vessels importing/exporting material to and from the Proposed Development.
- 7.15.6.2 Embodied emissions are the carbon footprint of a material (i.e. the total emissions released throughout the supply chain of the material). This includes the energy required for extraction, processing, operation and disposal or recycling of a material. For some materials, such as steel, the use of recycled materials has a lower embodied GHG emission than the use of virgin material. These emissions will be estimated using the UK Environment Agency (EA) Carbon Calculator for Construction Sites.
- 7.15.6.3 The reduction in greenhouse gas emissions from the national grid associated with the operational phase of the Proposed Development will be calculated using the following formula:
 - Tonnes CO_{2eq} = (A x B x C x D) / 1000

7.15.6.4 Where: A = The rated capacity of the wind energy development in MW; B = The capacity factor, which takes into account the intermittent nature of the wind, the availability of wind turbines and array losses etc. A capacity factor of 40% will be assumed for the Proposed Development. C = The number of hours in a year, 8,760 hours. D = Carbon load in grams per kWh (kilowatt hour) of electricity generated and distributed via the national grid. The latest data reported by the EPA states that the emissions intensity of power generation in 2017 was 437 gCO₂/kWh (Ireland's Final Greenhouse Gas Emissions 1990 to 2017, April 2019).

7.15.7 Designed-in measures and mitigation

- 7.15.7.1 The following designed-in measures are proposed in relation to climate:
 - The potential for use of materials with a reduced environmental impact may be incorporated into the construction design through re-use of materials or incorporation of recycled materials in place of conventional building materials.

7.16 Population and Human Health

- 7.16.1.1 This EIAR chapter will consider the potential impacts of the Proposed Development on Population (employment) during the construction, operational and maintenance and decommissioning phases. Impacts on amenity will be addressed in the Seascape, Landscape and Visual Impact EIAR chapter (see section 7.11). Impacts on recreational activities carried out below the HWM will be addressed in the Infrastructure and Other Users chapter (see section 7.12). Impacts on commercial fisheries and aquaculture will be addressed in Commercial Fisheries and Aquaculture chapter.
- 7.16.1.2 The EIAR will also consider the potential impacts of the Proposed Development on Human Health.

7.16.1 Study area

- 7.16.1.1 The Proposed Development relates to offshore infrastructure only but the employment impacts will affect onshore receptors. The Population and Human Health Study Area will generally cover County Wicklow, but national level impacts will also be considered where relevant. It will be linked to the selection of construction and operational and maintenance ports and the supply of a range of inputs and services for the Proposed Development.
- 7.16.1.2 A larger Regional Population and Human Health Study Area will also be defined to reflect the wider reach of Irish Gross Value Added (GVA) and employment impacts that are likely to materialise through the supply chain and provision of labour.

7.16.2 Data sources

7.16.2.1 Information on population within the Population and Human Health Study Area and the Regional Population and Human Health Study Area will be collected through a detailed desktop review of existing studies and datasets. These are summarised at Table 7.28 below.

Table 7.28: Summary of key desktop reports.

Title	Source	Year	Author
Census Results	Census of Population	2006, 2011, 2016	Central Statistics Office (CSO)
Demography	SAPMAP	2006, 2011, 2016	CSO
Wicklow County Development Plan 2016-2021	Wicklow County Council	2016	Wicklow County Council
Project Ireland 2040 - National Planning Framework and National Development Plan 2018-2027	DHPLG	2018	DHPLG

Title	Source	Year	Author
Regional Spatial and Economic Strategy for the Eastern and Midlands Regional Assembly	Eastern and Midlands Regional Assembly	2019	Eastern and Midlands Regional Assembly
ESRI Quarterly Economic Commentary	ESRI	Quarterly	ESRI

7.16.2.2 In addition to the sources listed above, Ordnance Survey Ireland (OSI) Maps, Google Earth/Maps, Myplan.ie and Fáilte Ireland will be consulted.

7.16.3 Baseline environment

- 7.16.3.1 The baseline that will be established will provide data on the following topic areas:
 - Population;
 - Demographics;
 - Employment and economic deprivation; and
 - Tourism and recreation.

7.16.4 Potential impacts

7.16.4.1 Table 7.29 presents the potential impacts on population and human health that could arise from the Proposed Development during the construction, operational and maintenance and decommissioning phases.

Table 7.29: Impacts to be scoped in for the Population and Human Health EIAR chapter.

Potential	Phase			Justification									
impact	С	ο	D										
Increase in	✓	✓	✓	Construction and decommissioning phases									
employment and demand for services				• The design and planning stage would provide employment for a number of technical consultants. There is likely to be direct employment for tradesmen, labourers and specialised contractors.									
				• There is likely to be significant need for local support services during the construction period. Any of the specialist contractors may be required to stay in the area over the construction period and may require the support of local hotel, accommodation and other service industries. Marine operations are less likely to require local service providers.									
				• It is likely that suppliers and contractors will be required to fabricate and/or deliver turbines, sub-structures, cables, electrical systems, substations and control systems.									
				Operational and maintenance phase									
				• During the operational life of the Proposed Development there will be an ongoing programme of maintenance that will require the provision of permanent locally based work force and facilities.									
										• The maintenance of the Proposed Development will require the provision and support of dedicated vessels and the creation of a dedicated work force which will be augmented by specialist contractors on a regular basis.			
				• The regular servicing and upgrades are likely to require external specialist contractors input, some will be required to stay in the area and may require the support of local hotel, accommodation and other service industries.									
Potential	Phase			Justification									
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impact	С	Ο	D										
Impacts on	1	√	✓	Construction and decommissioning phases									
human health				• During the construction and decommissioning phases, there is the potential for impacts on human health arising from activities such as the movement of materials and workforce associated with the Proposed Development.									
				• Potential impacts on coastal water quality will be examined to understand if there is a pathway for impact on human health e.g. impacts on bathing water quality.									
							Operational and maintenance phase						
				• During the operational and maintenance phase there is potential for positive impacts on human health associated with increased employment opportunities locally.									

7.16.5 Impacts scoped out of further assessment

7.16.5.1 Table 7.30 presents impacts to be scoped out of the Population and Human Health EIAR chapter.

Table 7.30: Im	pacts to be sco	ped out of the Po	pulation and Human	Health EIAR chapter.

Potential impact	Justification
Potential effects on human health arising from changes in air or soil quality	The risks to human health from a project are typically considered in the context of the environmental pathways such as air, water or soil through which health could be impacted. As outlined in section 7.14, likely significant effects on air quality are not expected and therefore further assessment on air quality has been scoped out of the EIAR. Soil is not a factor for consideration due to the offshore nature of the Proposed Development. On this basis, it is proposed that potential impacts on human health during the operation of the Proposed Development are scoped out of the EIAR.

7.16.6 Proposed assessment methodology

- 7.16.6.1 This assessment will be undertaken using the guidelines set out in section 6.5 of this Scoping Report.
- 7.16.6.2 The population and human health impacts of the construction and operation of the Proposed Development have the potential to be significant and will impact at a regional and local level.
- 7.16.6.3 Impacts will vary considerably depending on the technology deployed, type of structures, contracting strategy and other factors such as the availability and capacity of the supply chain. A range of scenarios will be considered.
- 7.16.6.4 It is proposed that population and human health impacts at the national level will be quantified as part of the EIA exercise where relevant (e.g. GVA); furthermore known or envisaged manufacturing, procurement and logistical matters may have impacts beyond local and regional.
- 7.16.6.5 The assessment will be based on a desktop review of existing relevant studies and national datasets and indicators. The economic impacts and benefits of the Proposed Development will be quantified in terms of Irish GVA and expected jobs in Ireland.
- 7.16.6.6 Social impacts will also be considered on a qualitative basis and will complement the economic impact assessment. In the context of an offshore wind farm, the definition of "community" needs to be examined at a local, regional and national level. Qualitative factors will be examined to see how the Proposed Development is likely to impact on people, considering: Community Structure and Infrastructure, Community Behaviour and Perceptions, Social Equity and Individuals.
- 7.16.6.7 Human health impacts will be considered by drawing on the results of the other impact assessments in the EIAR.

7.16.7 Designed-in measures and mitigation

7.16.7.1 It is anticipated that the overriding Population and Human Health impacts of the Proposed Development will be positive in nature. Consultation will be carried out with local stakeholders to maximise the positive impacts. The wider consultation strategy is discussed further in section 3.2 of this Report. A community fund will also be available for local community and voluntary organisations.

7.17 Major accidents and natural disasters

- 7.17.1.1 This EIAR chapter will consider the vulnerability of the Proposed Development to risks of major accidents and/or disasters.
- 7.17.1.2 Annex IV (information for the EIAR) of the 2014 EIA Directive requires:

"A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned."

7.17.1.3 The 2014 Directive also states:

"In order to ensure a high level of protection of the environment, precautionary actions need to be taken for certain projects which, because of their vulnerability to major accidents, and/or natural disasters (such as flooding, sea level rise, or earthquakes) are likely to have significant adverse effects on the environment. For such projects, it is important to consider their vulnerability (exposure and resilience) to major accidents and/or disasters, the risk of those accidents and/or disasters occurring and the implications for the likelihood of significant adverse effects on the environment."

7.17.1.4 The Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2017) elaborate on risk assessment further:

"To address unforeseen or unplanned effects the Directive further requires that the EIAR takes account of the vulnerability of the project to risk of major accidents and /or disasters relevant to the project concerned and that the EIAR therefore explicitly addresses this issue. The extent to which the effects of major accidents and / or disasters are examined in the EIAR should be guided by an assessment of the likelihood of their occurrence (risk) (section 3.7.3 of EPA, 2017)."

7.17.1.5 The EIAR will address the vulnerability of the Proposed Development to risks of major accidents and/or disasters and the subsequent potential for the Proposed Development to cause risks to the environment. The chapter will draw on the relevant EIA topic chapters. For example, the potential for vessel-to-vessel collisions would be assessed in the Shipping and Navigation EIAR chapter (see section 7.9). Details of site security, project resilience and emergency response protocols would also be set out as part of the Description of Development chapter.

8. SUMMARY OF EIA SCOPING

8.1 Summary

8.1.1.1 This Scoping Report has set out the scope of the EIAR along with the proposed approaches that will be used to enable an assessment of the likely significant effects of the Proposed Development. Table 8.1 provides a summary of the impacts that are proposed to be scoped in and out of the EIAR. The impacts scoped in will be further assessed and reported on in the EIAR.

Table 8.1: Summary of EIAR Scoping topics to be assessed and in relation to phase.

Environmental Topic	Phase			
	Construction	Operation	Decommissioning	
Coastal Processes	√	✓	✓	
Airborne Noise	✓	×	✓	
Benthic Subtidal and Intertidal Ecology	✓	✓	✓	
Fish, Shellfish and Sea Turtle Ecology	✓	✓	✓	
Marine Mammals	✓	✓	✓	
Offshore Ornithology	✓	✓	✓	
Commercial Fisheries and Aquaculture	✓	✓	✓	
Shipping and Navigation	✓	✓	✓	
Civil and Military Aviation	✓	✓	✓	
Seascape, Landscape and Visual Amenity	✓	✓	✓	
Marine Archaeology	✓	✓	✓	
Infrastructure and Other Users	✓	✓	✓	
Air Quality and Climate	✓	✓	✓	
Population and Human Health	✓	✓	1	

8.2 EIAR structure and content

8.2.1.1 An indicative structure of the EIAR for the Proposed Development is set out in Table 8.2.

Table 8.2: Indicative structure of the Proposed Development offshore infrastructure EIAR.

Volume	Chapter/Report
Volume 1	Non-Technical Summary (NTS)
Volume 2 – Preface, Chapters 1 to 5 (Introductory,	Preface
background and need for the Proposed Development)	Introduction
	Policy and Legislation
	Consideration of Alternatives
	Description of Development
	EIA Methodology
Volume 2 – Chapters 6 to 23 (Specialist Assessments)	Coastal Processes
	Airborne Noise
	Benthic Subtidal and Intertidal Ecology
	Fish, Shellfish and Sea Turtle Ecology
	Marine Mammals

Volume	Chapter/Report			
	Offshore Ornithology			
	Commercial Fisheries			
	Shipping and Navigation			
	Civil and Military Aviation			
	Seascape, Landscape and Visual Amenity			
	Marine Archaeology			
	Infrastructure and Other Users			
	Air Quality and Climate			
	Population and Human Health			
	Major Accidents and Natural Disasters			
	Interactions			
	Summary of Cumulative Effects			
	Summary of Mitigation, Monitoring and Residual Effects			
Volume 3 (Technical Appendices)	Consultation Report			
	CIA Screening Annex			
	Outline Environmental Management Plan			
	Transboundary Annex			
	Coastal Processes Technical Report			
	Airborne Noise Technical Report			
	Subsea Noise Technical Report			
	Benthic Subtidal and Intertidal Ecology Technical Report			
	Fish, Shellfish and Sea Turtle Ecology Technical Report			
	Marine Mammals Technical Report			
	Offshore Ornithology Technical Report			
	Offshore Bats Technical Report			
	Commercial Fisheries Technical Report			
	Shipping and Navigation Technical Report			
	Seascape and Landscape Visual Impact Technical Report			
	Marine Archaeology Technical Report			

8.2.1.2 The Natura Impact Statement (NIS) will be submitted following screening for Appropriate Assessment. The NIS will provide a clear statement of whether, or not, in view of best scientific knowledge and the conservation objectives of the European site(s), the Proposed Development, individually or in combination with other plans or projects, may adversely affect the integrity of any European site(s).

8.3 Next steps

- 8.3.1.1 Using this EIA Scoping Report as the basis, the Developer is seeking feedback from the stakeholders outlined in Appendix A on the following:
 - The key issues to be addressed in the EIAR;
 - The proposed content of the EIAR and the potential impacts that have been scoped in/out;
 - The proposed assessment methodologies to assess the potential impacts; and
 - Any other data that the environmental assessments should consider and address in the EIAR.

- 8.3.1.2 All feedback can be submitted to the following: Arklow.Bank@rpsgroup.com
- 8.3.1.3 RPS will continue to scope the EIAR as further assessment is undertaken on the Proposed Development and in consultation with the design team. Scoping will be ongoing through the preparation of the EIAR.
- 8.3.1.4 All feedback received during the scoping process will be considered by the Developer and the EIAR scope updated as required. The EIAR will record all issues raised during the scoping process and how they have been addressed in the EIAR.

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Appendix A

List of Scoping Consultees

Appendix A: List of consultees.

Scoping consultees
An Bord Pleanala – SID Unit
An Chomhairle Ealaíon (The Arts Council)
An Taisce
Arklow Port
Birdwatch Ireland
Bord Iascaigh Mhara
Carlow Council
Casement Military Aerodrome
CHC Helicopters
Commission for Regulation of Utilities
Commissioners of Irish Lights
Comreg
D2 Harbour Belfast
DAA
DAFM - Sea Fisheries Protection Agency
Department of Agriculture, Food and the Marine
Department of Communications, Climate Action and Environment
Department of Culture, Heritage and the Gaeltacht
Department of Housing Planning and Local Government
Department of Defence - Naval and Aer Corps
Department of Transport (Marine Survey Office)
Development Applications Unit - NPWS
DLR Co Co - Dun Laoghaire Port
Dun Laoghaire Rathdown Council
Eastern and Midland Regional Assembly
Eirgrid
Enterprise Ireland
Environmental Protection Agency
Fáilte Ireland
Gas Networks Ireland
Geological Survey of Ireland
Harland and Wolfe
Health and Safety Authority
Health and Safety Executive
Heritage Council
IDA
Inland Fisheries Ireland
Irish Aviation Authority
Irish Coast Guard
Irish Mussel Seed Company
Irish Sailing Association
Irish Water
Irish Whale and Dolphin Group

Scoping consultees
Irish Wildlife Trust
Marine Institute
Met Eireann
Office of Public Works
Port of Cork
RNLI
Rosslare Port
SEAI
South East Regional Inshore Fisheries Forum
Transport Infrastructure Ireland (TII)
Underwater Archaeology Unit
Weston Aerodrome
Wexford County Council
Wicklow Council

Transboundary consultees
Northern Ireland
Department of Agriculture, Environment and Rural Affairs
Northern Ireland Environment Agency (NIEA)
Department for Infrastructure
Maritime and Coastguard Agency
England, Wales and Scotland
Department for Business, Energy and Industrial Strategy
Marine Management Organisation (MMO)
Marine Scotland
Natural Resources Wales (NRW)
The Environment Agency (EA)
Scottish Environmental Protection Agency (SEPA)
Cefas
Maritime and Coastguard Agency
Joint Nature Conservation Committee (JNCC)
Natural England
Scottish Natural Heritage
Isle of Man
Department of Environment, Food and Agriculture
Department of Infrastructure
Cefas
France
Ministère des Affaires étrangères
Armateurs de France
Préfecture Maritime de la Manche et de la Mer du Nord
Secrétariat Général de la Mer
CRPMEM Nord
Fédération Nationale de la Pêche

Transboundary consultees

FROM Nord

CME Organisation de Producteur

Appendix B Potential Transboundary Impacts

B.1 Introduction

B.1.1 Background

- B.1.1.1 Arklow Bank Wind Park (ABWP) is an offshore wind farm project situated on and around Arklow Bank in the Irish Sea, approximately 6 to 13 km to the east of Arklow in County Wicklow. A Foreshore Lease was granted by the Minister for Marine and Natural Resources for the offshore infrastructure of the ABWP in 2002. The Developer now proposes to build out Phase 2 of the ABWP offshore infrastructure (i.e. the remainder of the ABWP offshore infrastructure hereinafter referred to as 'the Proposed Development') under the terms of the Foreshore Lease. The Developer has submitted an application to extend the long stop dates (hereinafter referred to as the 'Application for an Extension') for the remaining offshore infrastructure.
- B.1.1.2 The Foreshore Lease covers an area of 60 km² (a rectangular block approximately 27 km long and 2.5 km wide) for the installation of the offshore infrastructure (see Figure B.1).
- B.1.1.3 This transboundary appendix sets out an assessment of the potential for the Proposed Development to cause significant effects on the environment or significant adverse transboundary impacts.
- B.1.1.4 This appendix is intended to provide information to the Minister for Housing, Planning and Local Government (the Minister) in order for them to evaluate the likelihood of such effects occurring and the need, if any, for transboundary consultation with another state. The potential for transboundary effects will be revisited in the EIAR for the Proposed Development to ensure that any possible significant transboundary effects are fully considered.

B.1.2 Legislative context

- B.1.2.1 The need to consider transboundary impacts has been embodied by The United Nations Economic Commission for Europe (UNECE) Convention on Environmental Impact Assessment in a Transboundary Context, adopted in 1991 in the Finnish city of Espoo and commonly referred to as the 'Espoo Convention'. The Convention requires that assessments are extended across borders between Parties of the Convention when a planned activity may cause significant adverse transboundary impacts. The Espoo Convention has been ratified by the European Union, Ireland and the United Kingdom. It is aimed at preventing, mitigating and monitoring environmental damage by ensuring that explicit consideration is given to transboundary environmental factors before a final decision is made as to whether to approve a project. The Espoo Convention requires that the Party of origin notifies affected Parties about projects listed in Appendix I and likely to cause a significant adverse transboundary impact.
- B.1.2.2 Article 7 of Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment ('the EIA Directive') as amended by Directive 2014/52/EU introduces similar requirements concerning projects carried out in one Member State but likely to have significant effects on the environment of another. While the EIA Directive provides a definition of the term 'project' the 1991 Espoo Convention uses the term 'proposed activity'.





B.1.2.3 Article 7(4) of the amended EIA Directive states:

"The Member States concerned shall enter into consultations regarding, inter alia, the potential transboundary effects of the project and the measures envisaged to reduce or eliminate such effects and shall agree on a reasonable time-frame for the duration of the consultation period".

- B.1.2.4 The EPA Draft Guidelines (2017) also outline that, in the case of an EIAR, for any project that is likely to cause significant transboundary effects, contact with the relevant authorities in other Member States should be made. This will establish a consultation framework to consider and address these effects.
- B.1.2.5 The UK Planning Inspectorate (PINS) Advice Note 12: Transboundary Impacts (PINS, 2015) sets out procedures for consultation where a development may have significant transboundary impacts. Whilst the Advice Note has been prepared by PINS, it has been used to inform this transboundary appendix. The Advice Note sets out the role of EEA states and developers. Based on Advice Note 12, developers are advised to:
 - Consider, when preparing documents for consultation and application, that the Minister may notify the relevant EEA State of their particular project;
 - Carry out preparatory work to complete a transboundary screening matrix to assist the Minister in determining the potential for likely significant effects on the environment in other EEA States; and
 - Submit the transboundary screening matrix at the EIA scoping stage.
- B.1.2.6 This transboundary appendix provides an assessment of the potential for significant transboundary effects considering the criteria and relevant considerations set out in Annex 1 of PINS Advice Note 12. It provides information about the Proposed Development and sets out information relating to the potential effects of the Proposed Development and the interests of the other States in the vicinity, in order to assist the Minister in forming a view on the likelihood of significant transboundary effects arising from the Proposed Development.

B.1.3 Consultation

B.1.3.1 The Developer is conducting informal scoping consultation for the Proposed Development through the issue of this Scoping Report. As part of this consultation, the ministries and industries in the United Kingdom of Great Britain and Northern Ireland, the Isle of Man and France will be consulted, as set out in Appendix A.

B.1.4 Potential transboundary impacts

- B.1.4.1 The assessment of potential transboundary impacts associated with the Proposed Development is presented in two main sections below, 'Physical and biological environment' and 'Human environment'.
- B.1.4.2 A series of matrices for potential transboundary impacts associated with the Proposed Development are presented in Table B.2 for physical and biological receptors and Table B.3 for human activities respectively. The information presented in these matrices is based on the impacts identified to be scoped into the EIAR based on the Description of the Development presented in section 4 of this Scoping Report, and follow the suggested format set out in Annex 1 to PINS Advice Note 12.
- B.1.4.3 The matrices consider all potential transboundary impacts that may occur from all phases of the Proposed Development (i.e. construction, operational and maintenance, and decommissioning). The matrices also address the predicted spatial and temporal scale of potential transboundary impacts for those interests that are proposed to be screened into the assessment within the EIAR.
- B.1.4.4 Potential effects upon European designated sites within other states (as well as those in Ireland) are considered separately within the screening process for the Natura Impact Statement (NIS).
- B.1.4.5 The distance of the Proposed Development from the boundary of the EEZ or 'median line' of other states considered is presented in Table B.1 and shown on Figure B.1.

Table B.1: Summary of approximate distances to nearest Exclusive Economic Zone (EEZ) (median line) of countries in the United Kingdom, Isle of Man and France.

EEZ	Distance from the Lease Area to nearest border (km)
Wales	31
Northern Ireland	100
Isle of Man	122
England	161
Scotland	180
France	373

Physical and biological environment

- B.1.4.6 The Developer has completed a matrix to consider the potential for significant transboundary effects for the physical and biological environment. This matrix is set out in Table B.2 below.
- B.1.4.7 The conclusions for each physical and biological environment topic are presented, together with additional justification, in the following sections.

Table B.2: Matrix for the identification of potential significant transboundary effects for the Proposed Development – physical and biological environment.

Criteria	Coastal processes	Airborne noise	Benthic subtidal and intertidal ecology	Fish, shellfish and sea turtle ecology	Marine mammals	Offshore ornithology
Characteristics of the Proposed Development	For a detailed description of the characteristics of the Proposed Development, see section 4 of this Scoping Report. The Proposed Development is an offshore wind farm comprising up to 76 wind turbines and up to two Offshore Substation Platforms (OSPs) with an overall generating capacity of up to 520 MW. A range of turbine models will be considered including turbines with a maximum blade tip height of c. 197 m above Mean High Water. Foundation options under consideration comprise monopile, tripod jackets or gravity bases. Scour protection including rock placement, concrete mattresses and artificial fronds are being considered as part of the Description of the Development (Section 4). Inter-array cables and up to two offshore export cables (using the consented offshore export cable routes) will be installed to connect the turbines to the OSPs and the OSPs to the landfall. Cable protection may also be installed.					
Geographical area	The Foreshore Lease Area is located 6 to 13 km off the east coast of Ireland, near the town of Arklow (see Figure B.1 and Figure 4.1 of this Scoping Report). The closest EEZ (median line) border is 31 km east of the Foreshore Lease Area (Wales).					
Location of the Proposed Development (including existing use)	The Proposed Development is located in the consented Arklow Bank Wind Park Foreshore Lease Area and offshore export cable routes and covers an area of approximately 67.5 km ² . Phase 1 of the ABWP, consisting of seven wind turbines, was constructed within the Foreshore Lease Area between 2003 and 2004 and is owned and operated by GE Wind Energy.					
Potential impacts and pathways	No significant	No significant	No significant	See paragraph B.1.4.19	See paragraph B.1.4.25	See paragraph B.1.4.30
Environmental importance	are predicted.	are predicted.	are predicted.	See paragraph B.1.4.20	See paragraph B.1.4.24	See paragraph B.1.4.31
Extent	See paragraph B.1.4.9	See paragraph B.1.4.12	See paragraph B.1.4.15	See paragraph B.1.4.21	See paragraph B.1.4.26	See paragraph B.1.4.31
Magnitude	The magnitude of the impacts will be subject to the assessment to be undertaken for the EIA and have, therefore, not been determined at this stage.					
Probability	_					
Duration	No significant	No significant	No significant transboundary impacts are predicted.	See paragraph B.1.4.21	See paragraph B.1.4.26	See paragraph B.1.4.31
Frequency	are predicted.	are predicted.				
Reversibility		-	•			
Cumulative impacts	The potential cumulative impacts with other projects and plans will be assessed in the EIAR, as stated in section 6.7 of this Scoping Report.					

Coastal processes

- B.1.4.8 The coastal processes baseline for the Proposed Development is set out in Section 7.2.3 of this Scoping Report.
- B.1.4.9 The Foreshore Lease Area and offshore export cable routes are located wholly within Irish territorial waters. It is anticipated, based on an understanding of the baseline environment (e.g. tidal regime and sediment types), that impacts from sediment disturbance as a result of the installation and maintenance of foundations and cables are likely to be localised and temporary in nature. Any impacts on coastal processes from the presence of the foundation structures will be confined to the localised area of the footprint of the Foreshore Lease Area. Transboundary impacts are therefore not expected.
- B.1.4.10 It is therefore proposed that transboundary impacts upon coastal processes are screened out of the EIAR.

Airborne Noise

- B.1.4.11 The airborne noise baseline for the Proposed Development is set out in section 7.3.3 of this Scoping Report.
- B.1.4.12 Any airborne noise impacts arising from the construction and decommissioning phases of the Proposed Development will be localised to the vicinity of the Foreshore Lease Area, offshore export cable routes and immediate surrounding area. It is considered that there is no pathway (direct or indirect) by which airborne noise effects arising from the Proposed Development could significantly affect receptors of another state.
- B.1.4.13 It is therefore proposed that transboundary impacts upon receptors due to airborne noise arising from the Proposed Development are screened out of the EIAR.

Benthic subtidal and intertidal ecology

- B.1.4.14 The benthic subtidal and intertidal ecology baseline for the Proposed Development is set out in section 7.4.3 of this Scoping Report.
- B.1.4.15 It is considered that there is no pathway (direct or indirect) by which effects arising from the Proposed Development could significantly affect benthic subtidal and intertidal ecology receptors of another state. The extent of any predicted impacts on benthic subtidal and intertidal ecology receptors are expected to be limited in extent to:
 - The footprint of the Foreshore Lease Area and offshore export cable routes for any subtidal habitat loss or disturbance; colonisation of hard structures or removal of hard substrates; increased risk of introduction and spread of invasive and non-native species; and alteration of seabed habitats arising from changes in physical processes; and
 - One tidal excursion for increased suspended sediment concentrations and associated deposition and accidental pollution.
- B.1.4.16 It is therefore proposed that transboundary impacts upon benthic subtidal and intertidal ecology are screened out of the EIAR.

Fish, shellfish and sea turtles

- B.1.4.17 The fish, shellfish and sea turtle ecology baseline for the Proposed Development is set out in section 7.5.3 of this Scoping Report.
- B.1.4.18 There is potential for transboundary impacts on fish, shellfish and sea turtle ecology due to potential impacts arising from the construction, operational and maintenance and decommissioning phases of the Proposed Development.
- B.1.4.19 These impacts include underwater noise from piling activities during the construction phase; injury/disturbance to basking shark and sea turtle from vessel activities; changes in EMF from subsea electrical cabling during the operational and maintenance phase; habitat loss/disturbance (temporary and long term); increased suspended sediment concentrations and associated deposition; accidental pollution during all phases, and alteration of seabed habitats arising from changes in physical processes during the operational and maintenance phase.
- B.1.4.20 These activities have the potential to affect Annex II migratory fish species that are listed as features of European Sites in other states, species that are of commercial importance for fishing fleets of other states or species that are of international conservation importance (basking shark and sea turtles). Potential effects may include direct effects on individuals (e.g. mortality, injury or disturbance) or indirect effects due to loss/disturbance of important habitats (e.g. fish spawning and nursery habitats see paragraph 7.5.3.5 and Figure 7.9 to Figure 7.11 of section 7.5.3 of this Scoping Report for spawning and nursery grounds located within the vicinity of the Foreshore Lease Area and offshore export cable routes).
- B.1.4.21 The probability of impacts during the construction phase is high, although the extent cannot be determined at this stage and will be subject to assessment in the EIAR. The majority of impacts during construction however are considered to be short term and temporary. The operational and maintenance phase is considered less likely to result in significant impacts, although the effects associated with EMF and long term habitat loss would be, inherently, longer term effects. These effects however may be reversible, depending on the decommissioning strategy. The decommissioning phase is considered low risk for significant impacts, and any effects will be short term.
- B.1.4.22 Therefore, it is proposed that transboundary impacts on fish, shellfish and sea turtle receptors and their nature conservation interests are screened into the EIAR. Potential impacts upon European sites with Annex II fish species as a qualifying feature will be assessed within the NIS.

Marine mammals

- B.1.4.23 The marine mammal baseline for the Proposed Development is set out in section 7.6.3 of this Scoping Report.
- B.1.4.24 There is the potential for transboundary impacts upon marine mammals due to the mobile nature of marine mammal species and the proximity of the Proposed Development to the border of other states. Marine mammal species likely to be present in the vicinity of the Proposed Development include harbour porpoise, common dolphin, bottlenose dolphin, Risso's dolphin, minke whale, harbour seal and grey seal.
- B.1.4.25 Direct impacts include injury/disturbance to marine mammals arising from elevations in underwater noise from piling activities during the construction phase. Increased disturbance and collision risk to marine mammals could arise as a result of vessel activities during all phases of the Proposed Development whilst changes in EMF from subsea cabling may directly impact marine mammals during the operational and maintenance phase. Effects of accidental pollution could impact marine mammals directly during all phases of the Proposed Development. Indirect impacts to marine mammals include changes in prey availability (fish and shellfish community) during all phases of the Proposed Development.

- B.1.4.26 The probability of impacts to marine mammals occurring during construction, particularly as a result of underwater noise from piling, is high. As stated above (section B.1.4.25) the extent cannot be determined at this stage and will be subject to assessment in the EIAR. The majority of impacts during construction are however considered likely to be short term and temporary. The operational and maintenance phase is considered less likely to result in significant impacts, although any effects (e.g. injury and/or disturbance to marine mammals from vessel activities, changes in fish and shellfish community affecting prey resources and changes in EMF) are, inherently, longer term effects. These effects however may be reversible, depending on the decommissioning strategy. The decommissioning phase is considered low risk for significant impacts, and any effects will be short term.
- B.1.4.27 Therefore, it is proposed that transboundary impacts on marine mammal receptors and their nature conservation interests are screened into the EIAR. Potential impacts upon European sites with Annex II marine mammal species as a qualifying feature will be assessed within the NIS.

Offshore ornithology

- B.1.4.28 The offshore ornithology baseline for the Proposed Development is set out in section 7.7.3 of this Scoping Report.
- B.1.4.29 There is potential for transboundary impacts upon offshore ornithological receptors due to the wide foraging and migratory ranges of typical bird species in the Irish Sea. A number of bird species known to occur in the vicinity of the Proposed Development include those which are listed as qualifying features of European sites in other states. The bird species likely to be present in the vicinity of the Proposed Development include a range of seabirds which may be present in one or more seasons and could be included as features of designated sites in other countries (e.g. at breeding colonies in the UK and elsewhere) which pass through the Irish Sea on migration. This may also include terrestrial migrants (e.g. wildfowl and waders) which winter in Ireland and breed in other countries.
- B.1.4.30 The key direct impacts for ornithological receptors are likely to arise during the operational and maintenance phase. These impacts include direct mortality of individuals arising from potential collisions with rotating turbine blades and barrier effects caused by the physical presence of structures, which may inhibit clear transit of birds between breeding and foraging grounds, or on migration. Direct impacts may also arise as a result of temporary and/or long term habitat loss/disturbance during the construction, operational and maintenance and decommissioning phases. Indirect impacts may include changes in prey availability (fish and shellfish communities) due to changes to physical processes and habitat as a result of the presence of operational infrastructure.
- B.1.4.31 The probability of impacts during the construction and decommissioning phases are high (although species-specific) and are likely to be short term and temporary. The probability of impacts during the operational and maintenance phase is high, and impacts are likely to be long term, continuous and of varying spatial extent, depending on the species. The magnitude of these impacts is not known at this time and will be subject to assessment in the EIAR. These effects however may be reversible, depending on the decommissioning strategy.
- B.1.4.32 Therefore, it is proposed that transboundary impacts on offshore ornithology receptors and their nature conservation interests are screened into the EIAR. Potential impacts upon European sites with birds as a qualifying feature will be assessed within the NIS.

Human environment

- B.1.4.33 The Developer has completed a matrix to consider the potential for significant transboundary effects on the human environment. This matrix is set out in Table B.3 below.
- B.1.4.34 The conclusions for each human environment topic are presented, together with additional justification, in the following sections.

Table B.3: Matrix for the identification of	potential significant transboundary	y effects for the Proposed Develo	pment – human environment.
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Screening criteria	Commercial fisheries and aquaculture	Shipping and navigation	Civil and military aviation	Seascape, landscape and visual amenity	Marine archaeology	Infrastructure and other users	Population and human health			
Characteristics of the Proposed Development	For a detailed description of the characteristics of the Proposed Development, see section 4 of this Scoping Report. The Proposed Development is an offshore wind farm comprising up to 76 wind turbines and up to two Offshore Substation Platforms (OSPs) with an overall generating capacity of up to 520 MW. A range of turbine models will be considered including turbines with a maximum blade tip height of c. 197 m above Mean High Water. Foundation options under consideration comprise monopile, tripod jackets or gravity bases. Scour protection including rock placement, concrete mattresses and artificial fronds are being considered as part of the Description of the Development (section 4). Inter-array cables and up to two offshore export cables (using the consented offshore export cable routes) will be installed to connect the turbines to the OSPs to the landfall. Cable protection may also be installed.									
Geographical area	The Foreshore Lease Area is located 6 to 13 km off the east coast of Ireland, near the town of Arklow (see Figure B.1 and Figure 4.1 of this Scoping Report). The closest EEZ (median line) border is 31 km east of the Foreshore Lease Area (Wales).									
Location of the Proposed Development (including existing use)	The Proposed Development is located in the consented Arklow Bank Wind Park Foreshore Lease Area and offshore export cable routes and covers an area of approximately 67.5 km ² . Phase 1 of the ABWP, consisting of seven wind turbines, was constructed within the Foreshore Lease Area between 2003 and 2004 and is owned and operated by GE Wind Energy.									
Potential impacts and pathways	Commercial fisheries: see paragraph B.1.4.38 Aquaculture: No significant transboundary impacts are predicted	See paragraph B.1.4.41	No significant transboundary impacts are predicted	No significant transboundary impacts are predicted	No significant transboundary impacts are predicted	See paragraph B.1.4.56	See paragraph B.1.4.59			
Environmental importance	See paragraph B.1.4.39	See paragraph B.1.4.44	-			See paragraph B.1.4.56				
Extent	See paragraph B.1.4.35	See paragraph B.1.4.44	See paragraph B.1.4.47	See paragraph B.1.4.50 and B.1.4.51	See paragraph B.1.4.53	See paragraph B.1.4.56	See paragraph B.1.4.59			
Magnitude	The magnitude of the impacts will be subject to the assessment to be undertaken for the EIA and have, therefore, not been determined at this stage.									
Probability Duration	See paragraph B.1.4.39	See paragraph B.1.4.44	No significant transboundary	No significant transboundary	No significant transboundary	See paragraph B.1.4.56	See paragraph B.1.4.59			
Frequency										

Screening criteria	Commercial fisheries and aquaculture	Shipping and navigation	Civil and military aviation	Seascape, landscape and visual amenity	Marine archaeology	Infrastructure and other users	Population and human health
Reversibility			impacts are predicted	impacts are predicted	impacts are predicted		
Cumulative impacts	The potential cumulative impacts with other projects and plans will be assessed in the EIAR, as stated in section 6.7 of this Scoping Report.						

Commercial fisheries and aquaculture

- B.1.4.35 The commercial fisheries likely to be operating in the vicinity of the Proposed Development are outlined in section 7.9.3 of this Scoping Report.
- B.1.4.36 Due to the highly mobile nature of both commercial fish species and fishing fleets, there is the potential for transboundary impacts upon commercial fisheries receptors of other states. In addition to Irish vessels, vessels from France and the UK currently have access to fishing between the 6 and 12 nm limit as a result of historic fishing rights. In addition, in the case of UK vessels owned and operated from Northern Ireland, under the Sea-Fisheries (Amendment) Act 2019, access to fishing is also permitted to the area within the Irish 6 nm limit. Fishing vessels from these nations could therefore potentially target areas in the immediate area of the Proposed Development.
- B.1.4.37 Due to the static nature of aquaculture, it is not anticipated that there will be any potential for transboundary impacts upon aquaculture receptors of other states.
- B.1.4.38 The potential for transboundary impacts upon commercial fisheries may arise from two sources:
 - Effects on commercial fishing fleets from other states as a result of impacts from the Proposed Development on fish and shellfish stocks targeted by these fleets; and
 - Effects on commercial fishing fleets from other states as a result of effects on commercial fishing activities operating in the vicinity of the Proposed Development. These effects may include loss of or restricted access to fishing grounds and potential displacement of fishing activity into other areas, interference with fishing activities, increased steaming times and safety issues for fishing vessels.
- B.1.4.39 The probability of impacts occurring during the operational and maintenance phase, particularly as a result of the presence of the offshore infrastructure associated with the Proposed Development, is likely to be high. However, this would depend on the level of fishing activity by other states that the area of the Proposed Development may sustain. The extent of the potential impact will be subject to assessment in the EIAR. Although impacts during the operational and maintenance phase are likely to be long term, it is likely that following cessation of construction that some fishing activity may be able to resume, depending on the final layout of the infrastructure. In addition, it is likely that any impacts from the Proposed Development would be reversible following decommissioning, as it is anticipated that all structures above the seabed will be completely removed and fishing activity would be able to result in significant impacts although the effects associated with the interference caused by the presence of infrastructure will progressively increase as the development is progressed.
- B.1.4.40 Therefore, it is proposed that transboundary impacts upon commercial fisheries are screened into the EIAR. It is proposed that transboundary impacts upon aquaculture are screened out of the EIAR.

Shipping and navigation

- B.1.4.41 The shipping and navigation baseline, including navigational features and vessel traffic, is outlined in section 7.10.3 of this Scoping Report.
- B.1.4.42 The Foreshore Lease Area is located approximately 3 nm to 7 nm from shore. Charted water depths within the Foreshore Lease Area range between 1 m and 34 m at Lowest Astronomical Tide (LAT), with the presence of Arklow Bank resulting in the high variation. The main types of vessels recorded in the vicinity of the Proposed Development are cargo vessels, recreational vessels and fishing vessels.
- B.1.4.43 There is the potential for transboundary impacts upon shipping routes which transit to/from other countries including the potential effects on shipping routes to/from Northern Ireland, Wales, England, Isle of Man and Scotland. There are two busy north-south routes passing east of Arklow Bank, mainly used by cargo vessels, which include traffic associated with ports in continental Europe such as The Netherlands, however any effects on ship routing to continental Europe is not expected to be significant considering the overall voyage distance. Other busy areas are associated with a north-south route passing inshore of Arklow Bank, and approaches to Arklow Harbour.
- B.1.4.44 The probability of impacts occurring during the operational and maintenance phase, particularly as a result of the presence of the offshore infrastructure associated with the Proposed Development, is likely to be high. The extent of the impact will be subject to assessment in the EIAR. Although impacts during the operational and maintenance phase are likely to be long term, it is likely that any impacts from the Proposed Development would be reversible following decommissioning, as it is anticipated that all structures above the seabed will be completely removed. The construction phase is considered less likely to result in significant impacts although the effects associated with the interference caused by the presence of infrastructure on shipping and navigation will progressively increase as the development is progressed.
- B.1.4.45 Therefore, it is proposed that transboundary impacts upon shipping and navigation (considering shipping routes to/from Northern Ireland, Wales, England, Isle of Man and Scotland) are screened into the EIAR.

Civil and military aviation

- B.1.4.46 The civil and military aviation baseline for the Proposed Development is outlined in section 7.11.3 of this Scoping Report.
- B.1.4.47 The Proposed Development is located entirely within Irish airspace and therefore no transboundary effects are predicted in relation to aviation airspace. The potential for transboundary impacts may arise from the presence of wind turbines during the operational and maintenance phase disrupting civil and military radar coverage from the UK however this is considered to be very unlikely. The probability of impacts occurring during the operational and maintenance phase as a result of the offshore infrastructure associated with the Proposed Development is likely to be very low, although the extent of the impact will be determined in the EIAR. Although such impacts would be long term, it is likely that they would be reversible after decommissioning, as it is anticipated that all structures above the seabed will be completely removed.
- B.1.4.48 It is therefore considered that there is no pathway (direct or indirect) by which effects arising from the Proposed Development could significantly affect civil and military aviation receptors of another Member State. As such, proposed transboundary impacts upon civil and military aviation are screened out of the EIAR.

Seascape, landscape and visual amenity

B.1.4.49 The baseline conditions for seascape, landscape and visual amenity are set out in section 7.11.3 of this Scoping Report. This includes landscape, seascape and land based visual receptors within the Seascape, Landscape and Visual Impact Assessment Study Area, initially defined as a 60 km radius from the Foreshore Lease Area, which extends into Welsh waters.

- B.1.4.50 It is considered that there is no pathway (direct or indirect) by which effects arising from the Proposed Development could significantly affect seascape, landscape and visual amenity receptors of another state. Temporary change to seascape, landscape and visual amenity during the construction and decommissioning phases, and changes to seascape and landscape character and visual amenity for the duration of the operational and maintenance phase, are expected to arise mainly within the landscape and seascape of the east coast of Ireland.
- B.1.4.51 In terms of sea-based receptors, the shipping and navigation baseline (outlined in section 7.10.3 of this Scoping Report) indicates that cargo vessels and ferries transiting to/from the UK and Europe pass within 10 nm of the Foreshore Lease Area. These are not expected to experience significant visual impacts. Potential significant impacts would therefore be limited to landscape, seascape and visual receptors within the Republic of Ireland. Therefore, it is proposed that transboundary impacts upon seascape, landscape and visual amenity are screened out of the EIAR.

Marine archaeology

- B.1.4.52 The marine archaeology baseline for the Proposed Development is set out in section 7.13.4 of this Scoping Report.
- B.1.4.53 It is considered that there is no pathway (direct or indirect) by which effects arising from the Proposed Development could significantly affect marine archaeology receptors of another state. The extent of any predicted impacts on marine archaeology receptors are expected to be limited to:
 - The footprint of the Foreshore Lease Area and offshore export cable routes for impacts associated with direct physical seabed disturbance; and
 - One tidal excursion for impacts associated with sediment deposition on the seabed.
- B.1.4.54 Therefore, it is proposed that transboundary impacts upon marine archaeology are screened out of the EIAR.

Infrastructure and other users (material assets)

- B.1.4.55 The infrastructure and other users baseline for the Proposed Development is set out in section 7.14.4 of this Scoping Report.
- B.1.4.56 Potential impacts upon infrastructure and other users of other states are limited to potential effects on communications infrastructure such as satellite communication and VHF radio, during the operational and maintenance phase of the Proposed Development. The extent of the potential impact will be assessed within the EIAR following consultation with relevant communications receptors. Although such impacts would be long term, they would be reversible following decommissioning, as it is anticipated that all structures above the seabed will be removed.
- B.1.4.57 Therefore, it is proposed that transboundary impacts upon infrastructure and other users are screened into the EIAR.

Population and human health

- B.1.4.58 The population and human health baseline for the Proposed Development is set out in section 7.15.3 of this Scoping Report.
- B.1.4.59 Potential impacts identified in section 7.16 of this Scoping Report include increase in employment and demand for services during all phases of the Proposed Development. The extent of this impact will be assessed in the EIAR. There is potential for transboundary impacts on other states relating to increase in employment and demand for services, through the purchase of project components, equipment and the sourcing of labour from companies based outside Ireland. The probability of impacts occurring at all phases of the Proposed Development is high. Impacts related to the construction and decommissioning phases would be temporary and short term. Impacts related to the operational and maintenance phase would be long term.
- B.1.4.60 Therefore, it is proposed that transboundary impacts upon Population and Human Health are screened into the EIAR.

B.1.5 Conclusions

- B.1.5.1 This Appendix has been prepared to provide an assessment of the potential for transboundary impacts on other states arising from the Proposed Development.
- B.1.5.2 On the basis of the information available, as detailed within this Scoping Report, there is the potential for the Proposed Development to have significant transboundary effects in other states. Transboundary impacts have been screened into the EIAR for the following topics:
 - Fish, shellfish and sea turtle ecology;
 - Marine mammals;
 - Offshore ornithology;
 - Commercial fisheries;
 - Shipping and navigation;
 - Infrastructure and other users; and
 - Population and human health.