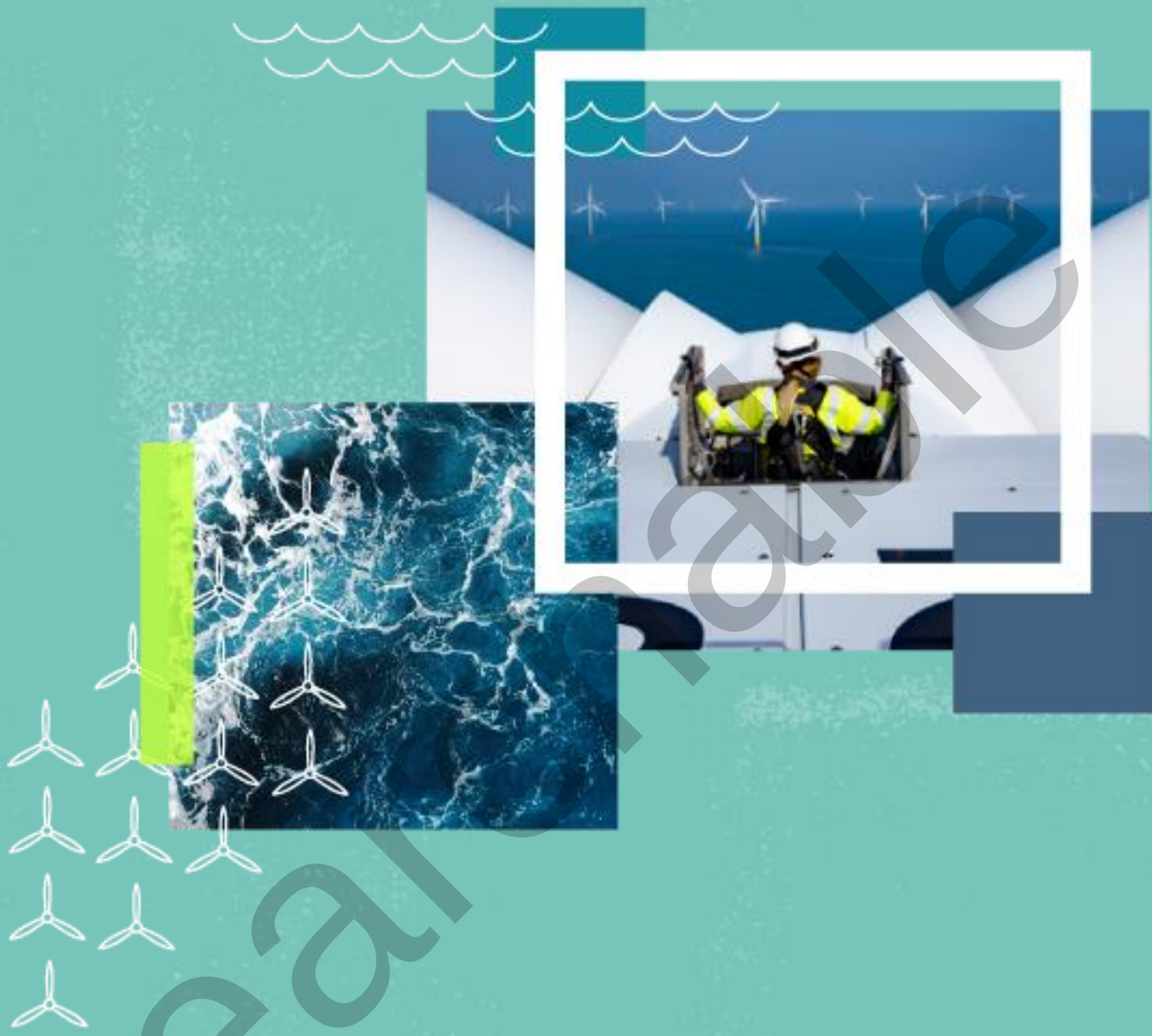


Arklow Bank Wind Park 2

Supporting Information for Screening for Appropriate Assessment Report

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Contents

FIGURES IV
TABLES V
GLOSSARY VII
ACRONYMS X
UNITS XV
1 APPROPRIATE ASSESSMENT 1
1.1 INTRODUCTION 1
1.2 LEGISLATION AND THE AA PROCEDURE IN IRELAND 1
1.3 PROCEDURE 3
2 DOCUMENT STRUCTURE 5
3 METHODOLOGY AND GUIDANCE 5
3.1 PUBLISHED GUIDANCE ON AA 5
3.2 LIKELY SIGNIFICANT EFFECT (LSE) 6
3.3 NIS ASSESSMENT APPROACH 6
3.4 MITIGATION MEASURE CONSIDERATION 7
3.5 CONSIDERATION OF *EX-SITU* EFFECTS 7
3.6 CONSERVATION OBJECTIVES (COS) 7
3.7 CONSIDERATION OF IN-COMBINATION EFFECTS 8
4 THE PROPOSED DEVELOPMENT 9
4.1 LOCATION 9
4.2 OVERVIEW OF THE PROPOSED DEVELOPMENT 13
4.3 CONSTRUCTION 28
4.4 OPERATION AND MAINTENANCE 49
4.5 DECOMMISSIONING 56
4.6 ADVISORY SAFETY ZONES 57
5 ENVIRONMENTAL BASELINE 58
5.1 INTRODUCTION 58
5.2 MARINE AND COASTAL HABITAT AND SPECIES QIS 58
5.3 INTERTIDAL ORNITHOLOGY AND WATERBIRDS 61
5.4 MARINE MAMMALS 62
5.5 SEABIRD POPULATIONS OF SPAS 64
5.6 MIGRATORY FISH 68
6 STAGE 1 SCREENING APPRAISAL, CONSIDERATION OF SIGNIFICANT EFFECT ALONE .. 70
6.1 DIRECTLY CONNECTED WITH OR NECESSARY TO THE MANAGEMENT OF THE SITE 70
6.2 EUROPEAN SITES 70
6.3 POTENTIAL EFFECTS 98
6.4 EVALUATION 101
6.5 COASTAL HABITAT AND SPECIES QIS 101
6.6 MARINE HABITAT QIS 103

Searchable

6.7 WADERS AND WILDFOWL POPULATIONS OF INTERTIDAL SPAS 107
6.8 SPA WETLAND HABITATS SCIS 108
6.9 MARINE SPECIES QIS 109
6.10 SEABIRD POPULATIONS OF SPAS 120
6.11 TERRESTRIAL AND FRESHWATER QIS 135
7 STAGE 1 SCREENING APPRAISAL, CONSIDERATION OF LSE IN-COMBINATION 136
7.1 REQUIREMENTS 136
7.2 APPROACH 136
7.3 PLANS AND PROJECTS SCREENED IN FOR IN-COMBINATION ASSESSMENT 138
8 CONCLUSIONS OF THE STAGE 1 SCREENING APPRAISAL 164
8.2 SUMMARY FOR SACS 164
8.3 SUMMARY FOR SPAS 190
9 NEXT STEPS 216
10 REFERENCES 217
11 APPENDIX 1: FILTERED TABLES OF EUROPEAN SITES 231

Figures

Figure 1.1: Procedure of Article 6 of the Habitats Directive (Source: European Commission, 2021) 4
Figure 4.2: Arklow Bank Wind Park 2 Site Layout - 47 WTGs 11
Figure 4.3: Arklow Bank Wind Park 2 Site Layout - 56 WTGs 12
Figure 6.1: Special Areas of Conservation (SACs) in the Zone of Influence of the Proposed Development along with sites identified for receptor groups. 72
Figure 6.2: Special Protection Areas (SPAs) in the Zone of Influence of the Array Area 73

Searchable

Tables

Table 4.1: Project Design Options (WTGs) 13
Table 4.2: Project Design Options (OSPs) 13
Table 4.3: WTG Infrastructure Parameters 14
Table 4.4: OSP topside infrastructure parameters 16
Table 4.5: Monopile foundation infrastructure parameters for WTGs and OSPs 17
Table 4.6: Scour protection infrastructure parameters 18
Table 4.7: Inter-array cable infrastructure parameters 18
Table 4.8: Interconnector cable infrastructure parameters 19
Table 4.9: Offshore export cable infrastructure parameters 19
Table 4.10: Cable protection infrastructure parameters 20
Table 4.11: Cable crossing infrastructure parameters 22
Table 4.12: Total installation vessels anticipated on site at one time 23
Table 4.13: Total anticipated installation vessel return trips during construction 25
Table 4.14: Total anticipated installation vessel return trips per year 27
Table 4.15: Anticipated jack up vessel footprints. 28
Table 4.17: Anticipated boulder clearance removal limits 35
Table 4.18: Anticipated seabed lowering clearance limits for WTG and OSP installation 35
Table 4.19: Anticipated seabed lowering / features clearance limits for cable installation 36
Table 4.20: Overview of the techniques used for seabed lowering/features clearance 37
Table 4.22: Anticipated monopile drilling characteristics 39
Table 4.23: Grout characteristics for monopile foundations 39
Table 4.24: Offshore export cable - landfall parameters 43
Table 4.26: Operational and maintenance activities - WTG foundations 51
Table 4.27: Operational and maintenance activities - OSP foundations 52
Table 4.28: Operational and maintenance activities – WTGs 53
Table 4.29: Operational and maintenance activities - OSPs 54
Table 4.30: Operational and maintenance activities - inter-array cables 54
Table 4.31: Operational and maintenance activities - interconnector cables 55
Table 4.32: Operational and maintenance activities - offshore export cables 55
Table 4.33: Anticipated maintenance vessel and helicopter parameters 56
Table 4.34: Decommissioning activities 57
Table 6.1: SACs within the precautionary ZoI applied for assessment of effects from the Proposed Development (note: distances shown are from the closest element of the Array Area) 74
Table 6.2: SPAs within the precautionary ZoI applied for assessment of effects from the Proposed Development 86
Table 6.3: Marine QI habitats potentially susceptible to water quality effects. 104
Table 6.46: SPAs with wetland habitat potentially susceptible to water quality effects 108
Table 6.5: Marine QI species potentially susceptible to the effects resulting from the Proposed Development 110
Table 6.6: SPAs designated for breeding seabird populations for which there may be a pathway of effect with the Proposed Development 121

Searchable

Table 7.1: List of other projects and plans considered within the in-combination assessment for Annex I coastal and marine habitats 138

Table 7.2: List of other projects and plans considered within the in-combination assessment for migratory fish 141

Table 7.3: List of other projects and plans considered within the in-combination assessment for marine mammals 146

Table 7.4: List of other projects and plans considered within the in-combination assessment for waders and offshore ornithology 157

Table 8.1: Outcome of Stage 1 Screening Appraisal for SACs (Sites and QIs where LSE can be excluded are shaded grey) 165

Table 8.2: Outcome of Stage 1 Screening Appraisal for SPAs (Sites and QIs where LSE can be excluded are shaded grey) 191

Table 11.1: SACs with terrestrial QIs for which there is no pathway of effect with the Proposed Development 231

Table 11.2: SAC with freshwater QIs for which there is no pathway of effect with the Proposed Development 233

Table 11.3: Coastal SAC QIs for which there may be a pathway of effect with the Proposed Development 234

Table 11.4: Marine SAC QIs for which there may be a pathway of effect with the Proposed Development 239

Table 11.5: SPAs designated for breeding seabird populations for which there may be a pathway of effect with the Proposed Development 244

Searchable

Glossary

Term	Meaning
Appropriate Assessment (AA)	An Appropriate Assessment (AA) is a four-stage process that is required for projects by the Habitats Directive. The first stage is to establish whether an AA is required, referred to as AA Screening. Where significant effects are deemed likely, an AA will be undertaken as the second stage.
Arklow Bank Wind Park 1 (ABWP1)	Arklow Bank Wind Park 1 consists of seven wind turbines, offshore export cable and inter-array cables. Arklow Bank Wind Park 1 has a capacity of 25.2 MW. Arklow Bank Wind Park 1 was constructed in 2003/04 and is owned and operated by Arklow Energy Limited. It remains the first and only operational offshore windfarm in Ireland.
Arklow Bank Wind Park 2 – Offshore Infrastructure	"The Proposed Development", Arklow Bank Wind Park 2 Offshore Infrastructure: This includes all elements under the existing Maritime Area Consent.
Arklow Bank Wind Park 2 (ABWP2) (The Project)	Arklow Bank Wind Park 2 (ABWP2) (The Project) is the onshore and offshore infrastructure. This EIAR is being prepared for the Offshore Infrastructure. Consents for the Onshore Grid Infrastructure (Planning Reference 310090) and Operations Maintenance Facility (Planning Reference 211316) has been granted on 26th May 2022 and 20th July 2022, respectively. Arklow Bank Wind Park 2 Offshore Infrastructure: This includes all elements to be consented in accordance with the Maritime Area Consent. This is the subject of this EIAR and will be referred to as 'the Proposed Development' in the EIAR. Arklow Bank Wind Park 2 Onshore Grid Infrastructure: This relates to the onshore grid infrastructure for which planning permission has been granted. Arklow Bank Wind Park 2 Operations and Maintenance Facility (OMF): This includes the onshore and nearshore infrastructure at the OMF, for which planning permission has been granted. Arklow Bank Wind Park 2 EirGrid Upgrade Works: any non-contestable grid upgrade works, consent to be sought and works to be completed by EirGrid.
Array Area	The Array Area is the area within which the Wind Turbine Generators (WTGs), the Offshore Substation Platforms (OSPs), and associated cables (export, inter- array and interconnector cabling) and foundations will be installed.
Birds Directive	Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds.
Conservation Objective	Conservation Objectives (COs) are set for European Sites for the purpose of ensuring site integrity is maintained. COs are published by the Statutory Nature Conservation Body (SNCB).
EirGrid	State-owned electric power transmission system operator (TSO) in Ireland and Transmission Asset Owner (TAO) for the Project's transmission assets.
European Sites	Protected sites designated through the Habitats Directive and Birds Directive, comprising Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).
Foreshore	The bed and shore, below the line of high water of ordinary or medium tides, of the sea and of every tidal river and tidal estuary and of every channel, creek, and

Searchable

Term	Meaning
	bay of the sea or of any such river or estuary including the subsoil below, and the water column above the bed and shore and extending to the 12 nautical mile limit.
Intertidal area	The area between the High Water Mark (HWM) and the low water mark (LWM).
Landfall	The area in which the offshore export cables make landfall and is the transitional area between the offshore cabling and the onshore cabling.
Maritime Area Consent (MAC)	A consent to occupy a specific part of the maritime area on a non-exclusive basis for the purpose of carrying out a Permitted Maritime Usage strictly in accordance with the conditions attached to the MAC granted on 22nd December 2022 with reference number 2022-MAC-002.
Natura 2000	A network of core breeding and resting sites for rare and threatened species, and rare natural habitat types, on land and sea, stretching across all European Union (EU) Member States. This term is interchangeable with European Sites.
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.
Permitted Maritime Usage	The construction and operation of an offshore windfarm and associated infrastructure (including decommissioning and other works required on foot of any permission for such offshore windfarm).
Profound Impact	An impact which erases sensitive characteristics.
Qualifying Interest (QI)	The specific habitats and or species for which a European Site is designated.
Scour protection	A solution for preventing scour around subsea structures, typically comprised of rock or concrete mattresses.
Site of Community Importance	A site which, in the biogeographical region or regions to which it belongs, contributes significantly to the maintenance or restoration at a favourable conservation status of a natural habitat type or of a species and may also contribute significantly to the coherence of Natura 2000.
Special Area of Conservation (SAC)	A European Site which is designated under the Habitats Directive which forms part of the Natura 2000 network.
Special Conservation Interest (SCI)	An ornithological feature for which an SPA is designated.
Special Protection Area (SPA)	A European Site which is designated under the Birds Directive which forms part of the Natura 2000 network.
Sound Exposure Level	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.

Searchable

Term	Meaning
Stage 1 Screening	An initial examination to establish whether, in relation to a particular plan or project, AA is required (also called Stage 1 assessment). Screening involves a determination, whether a plan or project, alone or in combination with other plans or projects, is likely to have significant effects on a European Site in view of the site's COs.
Stage 2 Appropriate Assessment	A determination by the Competent Authority under Article 6.3 of the Habitats Directive as to whether a proposed development would adversely affect the integrity of a European Site.
Statutory Nature Conservation Body	In Ireland, the National Park and Wildlife Service (NPWS), which is an executive agency of the Heritage Division of the Department of Culture, Heritage and the Gaeltacht, is the Statutory Nature Conservation Body (SNCB).
The Developer	Sure Partners Limited
Trenchless techniques	Trenchless techniques include steerable direct pipe thrusting ("Direct Pipe") and Horizontal Directional Drilling (HDD) which allow cable ducts to be installed underground without the need to excavate trenches.
The Habitats Directive	Council Directive 92/43/EEC of 21 May 1992 on the Conservation of natural habitats and of wild fauna and flora.

Searchable

Acronyms

Term	Meaning
AA	Appropriate Assessment
ABP	An Bord Pleanála
ABWP1	Arklow Bank Wind Park 1
ABWP2	Arklow Bank Wind Park 2
ADCP	Acoustic Doppler Current Profiler
AHTS	Anchor Handling Tug Supply
BDMPS	Biologically Defined Minimum Population Scales
CJEU	Court of Justice of the European Union
CLV	Cable Lay Vessel
CO	Conservation Objective
CPOD	Cetacean Porpoise Detectors
CPS	Cable Protection Systems
CPT	Cone Penetrations Test
CSV	Construction Support Vessel
CSTP	Celtic Sea Trout Project
CTV	Crew Transfer Vessel
CWP	Codling Wind Park
DAHG	Department of Arts, Heritage and the Gaeltacht
DAS	Digital Aerial Surveys
DCCAE	Department of Communications, Climate Action and Environment
DDD	Drive-Drill-Drive
DECC	Department of the Environment, Climate and Communications
DEHLG	Department of the Environment, Heritage and Local Government
DHLGH	Department of Housing, Local Government and Heritage
DP	Dynamic Positioning

Searchable

Term	Meaning
ECom	European Community (1993-2009) (for alternative meaning, see also below)
EC	European Commission (used in this report when referring to publications of the Commission)
EEC	European Economic Community (pre-1993)
EEZ	Exclusive Economic Zone
EIAR	Environmental Impact Assessment Report
EMF	Electro Magnetic Field
EPA	Environmental Protection Agency
EU	European Union (2009-present)
FR	France
GVI	General Visual Inspections
HAT	Highest Astronomical Tide
HDD	Horizontal Directional Drilling
HDPE	High Density Polyethylene
HRA	Habitat Regulations Assessment
HSA	Health & Safety Authority
HVAC	High Voltage Alternating Current
HWM	High Water Mark
IAC	Inter-Array Cables
IAQM	Institute of Air Quality Management
ICCP	Impressed Current Cathodic Protection
ICES	International Council for the Exploration of the Sea
IFI	Inland Fisheries Ireland
IWDG	Irish Whale and Dolphin Group
JCP	Joint Cetacean Protocol
JNCC	Joint Nature Conservation Committee
JUV	Jack-up Vessel

Searchable

Term	Meaning
LAT	Lowest Astronomical Tide
LSE	Likely Significant Effect
LWM	Low Water Mark
MAC	Maritime Area Consent
MBES	Multibeam Echosounder Systems
MMO	Marine Mammal Observer
MP	Monopiles
MPDM	Marine Planning and Development Management
MTBM	Micro Tunnel Bore Machine
MU	Management Unit
NBDC	National Biodiversity Data Centre
NE	North East
NIS	Natura Impact Statement
NNE	North-north-east
NPWS	National Parks and Wildlife Service
NRW	Natural Resources Wales
NW	North West
O&M	Operational and Maintenance
OGI	Onshore Grid Infrastructure
OMF	Operations and Maintenance Facility
OPR	Office of the Planning Regulator
OSP	Offshore Substation Platform
OWF	Offshore Windfarm
PAM	Passive Acoustic Monitoring
PDA	The Planning and Development Act 2000, as amended
PLGR	Pre-Lay Grapnel Run
PTS	Permanent Threshold Shift

Searchable

Term	Meaning
PV	Photovoltaic
QI	Qualifying Interest
ROV	Remote Operated Vehicle
RPM	Revolutions Per Minute
SAC	Special Area of Conservation
SBP	Sub-Bottom Profiler
SCADA	Supervisory Control and Data Acquisition
SCI	Special Conservation Interest (for alternative meaning, see also below)
SCI	Site of Community Importance
SCOS	Special Committee on Seals
SISAA	Supporting Information for Screening for AA Report
SMRU	Sea Mammal Research Unit
SNCB	Statutory Nature Conservation Body
SOV	Service Operation Vessels
SPA	Special Protection Area
SPL	Sure Partners Limited
SSS	Side Scan Sonar
SSW	South-South West
SW	South West
TJB	Transition Joint Bay
TP	Transition Piece
TSO	Transmission System Operator
TTS	Temporary Threshold Shift
USV	Unmanned Surface Vehicles
UXO	Unexploded Ordnance
VMP	Vessel Management Plan
VP	Vantage Point

Searchable

Term	Meaning
WROV	Work-class Remote operated Vehicle
WTG	Wind Turbine Generator
W2W	Walk-to-Work vessel
XLPE	Cross-linked Polyethylene
ZoI	Zone of Influence

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Units

Unit	Description
dB	Decibel (unit used to measure the intensity of sound)
GW	Gigawatt
km	Kilometre (distance; equal to 1,000 metres)
kn	Knots
kV	Kilovolt (electrical potential)
kW	Kilowatt (power)
m	Metre (distance; equal to 100 centimetres)
m^2	Metre Squared
MW	Megawatt (power; equal to one million watts)

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1 Appropriate Assessment

1.1 Introduction

1.1.1.1 This Report is for the purposes of a Stage 1 screening for Appropriate Assessment (AA) in relation to the application to An Bord Pleanála (ABP) for planning permission for the Arklow Bank Wind Park 2 (ABWP2) Offshore Infrastructure, herein referred to as "the Proposed Development". The Proposed Development is being developed by Sure Partners Limited (SPL), herein referred to as "the Developer".

1.1.1.2 The purpose of this Stage 1 Supporting Information for Screening for AA Report (SISAA) is to assist ABP in determining whether a Stage 2 AA is required and, if so, which European Sites and Qualifying Interests (QI)s should be included in the AA for the Proposed Development.

1.1.1.3 With the introduction of the Habitats Directive (Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora, 1992) came the obligation to establish the Natura 2000 network of Sites of Community Interest, comprising a network of areas of highest biodiversity importance for rare and threatened habitats and species across the European Union (EU).

1.1.1.4 The Natura 2000 network of sites comprises Special Areas of Conservation (SACs, including candidate SACs) designated under legislation transposing the obligations under the Habitats Directive, and Special Protection Areas (SPAs, including proposed SPAs) classified under the Birds Directive (Directive 2009/147/EC on the conservation of wild birds). SACs and SPAs make up the pan-European network of Natura 2000 sites in Ireland and they are referred to as European Sites.

1.1.1.5 SACs are designated for the conservation of Annex I habitats (including priority types which are in danger of disappearance) and Annex II species[1] (other than birds). SPAs are designated for the conservation of Annex II birds and other regularly occurring migratory birds and their habitats. The habitats and species for which each European Site is designated correspond to the Qualifying Interests (QIs) of the sites. From these qualifying features, the Conservation Objectives (COs) of the site are derived.

1.2 Legislation and the AA procedure in Ireland

1.2.1 The Habitats Directive

1.2.1.1 Article 6(3) of the Habitats Directive requires that:

"Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the

[1] '*Annex II: Animal and plant species whose conservation requires the designation of Special Areas of Conservation*'

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integrity of the site concerned and if appropriate, after having obtained the opinion of the general public."

1.2.1.2 Thus, Article 6(3) provides a two-stage process:

- The first stage involves a screening for AA; and
- The second stage therefore only arises where the conclusion of the screening is that an AA is required. Where it is concluded that an AA is not required, Stage 2 is not applicable.

1.2.1.3 For the purposes of applications for planning permission in Ireland, Part XAB of the Planning and Development Act 2000, as amended ("the PDA") transposes the obligations under the EU Habitats and Birds Directives into Irish law, and sets out the duties of the relevant Competent Authority i.e. ABP.

1.2.2 Screening for AA

1.2.2.1 Section 318(1) of the PDA applies Part XAB of the Act, with certain modifications to maritime development or proposed development to which Chapter III of Part XXI applies.

1.2.2.2 Under Part XAB of the PDA, the relevant provisions for AA screening is in section 177U. Section 177U(2) provides that (2) A Competent Authority shall carry out a screening for AA under subsection (1) before (a) a Land use plan is made including, where appropriate, before a decision on appeal in relation to a draft strategic development zone is made, or (b) consent for a proposed development is given. It states:

"The Competent Authority shall determine that an appropriate assessment of a draft Land use plan or a proposed development, as the case may be, is required if it cannot be excluded, on the basis of objective information, that the draft Land use plan or proposed development, individually or in combination with other plans or projects, will have a significant effect on a European Site".

1.2.2.3 Section 177U (5) states:

"The Competent Authority shall determine that an appropriate assessment of a draft Land use plan or a proposed development, as the case may be, is not required if it can be excluded, on the basis of objective information, that the draft Land use plan or proposed development, individually or in combination with other plans or projects, will have a significant effect on a European Site".

1.2.3 Appropriate Assessment

1.2.3.1 As consistent with the EU Habitats and Birds Directives, section 177V of the PDA determines that an AA shall include a determination by the Competent Authority as to whether a draft land use plan or proposed development would adversely affect the integrity of a European Site.

1.2.3.2 Section 177V (2) states:

"In carrying out an appropriate assessment under subsection (1) the Competent Authority shall take into account each of the following matters:

(a) the Natura impact report or Natura impact statement, as appropriate;

(b) any supplemental information furnished in relation to any such report or statement;

(c) if appropriate, any additional information sought by the authority and furnished by the applicant in relation to a Natura impact statement;

(d) any additional information furnished to the Competent Authority at its request in relation to a Natura impact report;

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(e) any information or advice obtained by the Competent Authority;

(f) if appropriate, any written submissions or observations made to the Competent Authority in relation to the application for consent for proposed development; and

(g) any other relevant information."

1.2.3.3 Section 177V (4) states:

"Subject to the other provisions of this Act, consent for proposed development may be given in relation to a proposed development where a Competent Authority has made modifications or attached conditions to the consent where the authority is satisfied to do so having determined that the proposed development would not adversely affect the integrity of the European site if it is carried out in accordance with the consent and the modifications or conditions attaching thereto."

1.3 Procedure

1.3.1.1 According to European Commission guidance documents 'Assessment of plans and projects significantly affecting Natura 2000 sites' (European Commission, 2001) and 'Managing Natura 2000 sites': The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC' (European Commission, 2019), the obligations arising under Article 6 establish a procedure for AA as follows, and as illustrated in Figure 1.1.

1.3.1.2 The first part of this procedure consists of a pre-assessment stage ('screening') to determine whether, firstly, a plan or project is directly connected with or necessary to the management of the site, and secondly, whether it is likely to have a significant effect on the site; it is governed by the first sentence of Article 6(3).

1.3.1.3 The second part of the procedure, governed by the second sentence of Article 6(3), relates to the AA and the decision of the competent national authority.

1.3.1.4 A third part of the procedure (governed by Article 6(4)) comes into play if, despite a negative assessment, it is proposed not to reject a plan or project but to give it further consideration. In this case Article 6(4) allows for derogations from Article 6(3) under certain conditions.

1.3.1.5 The extent to which the sequential steps of Article 6(3) apply to a given plan or project depends on several factors, and in the sequence of steps, each step is influenced by the previous step. The order in which the steps are followed is therefore essential for the correct application of Article 6(3).

1.3.1.6 Each step determines whether a further step in the process is required. If, for example, the conclusion at the end of a Stage 1 Screening Appraisal is that significant effects on European Sites can be excluded both alone and in-combination, there is no requirement to proceed to the next step.

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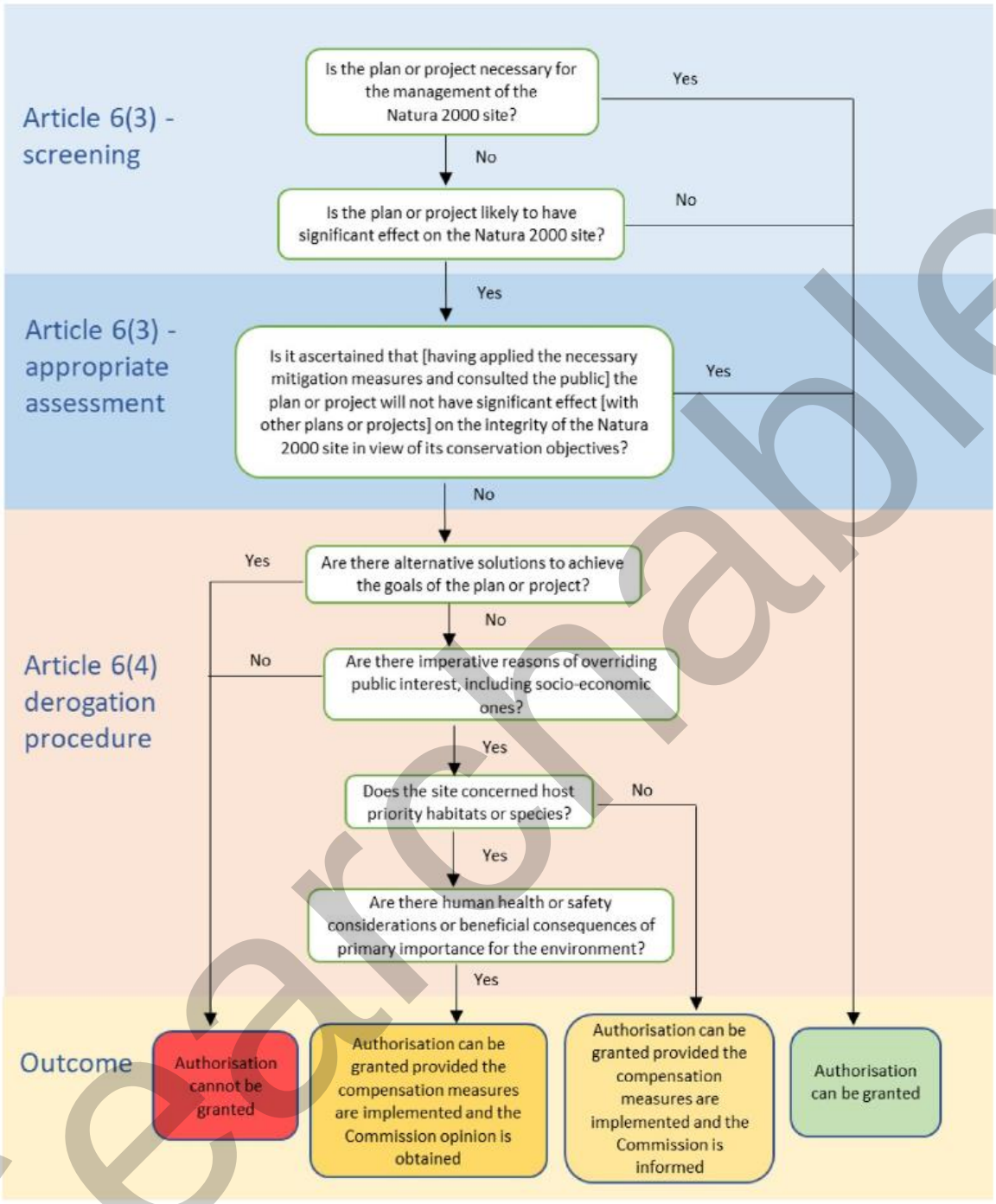


Figure 1.1: Procedure of Article 6 of the Habitats Directive (Source: European Commission, 2021)

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2 Document Structure

2.1.1.1 This report is structured as follows:

- Section 3: Methodology and Guidance – This section sets out the methodology followed, and guidance documents used in conducting a Stage 1 screening appraisal of the implications of the Proposed Development on European Sites;
- Section 4: The Proposed Development – This section describes the Proposed Development to be assessed in Section 6;
- Section 5: Environmental Baseline – This section is the basis of the subsequent Stage 1 screening appraisal that follows;
- Section 6: Stage 1 Screening Appraisal, Consideration of Significant Effect Alone – This section contains a preliminary examination and analysis to evaluate whether the Proposed Development alone is likely to have a significant effect on any European Site. The appraisal has been undertaken in view of best scientific knowledge, considering the COs of the sites concerned.
- Section 7: Stage 1 Screening Appraisal, Consideration of LSE In-combination – Following the Stage 1 appraisal of the project effects alone, this section contains a preliminary examination and analysis to evaluate whether the Proposed Development is likely to have a significant effect on any European Site in-combination with other plans or projects. The appraisal has been undertaken in view of best scientific knowledge, considering the COs of the sites concerned.
- Section 8: Conclusions of the Stage 1 Screening Appraisal – This section provides a summary of conclusions of the Stage 1 Screening appraisal, both alone and in-combination.

3 Methodology and Guidance

3.1 Published guidance on AA

3.1.1.1 AA Guidelines for Planning Authorities have been published by the Department of the Environment, Heritage and Local Government (DEHLG, 2010a). In addition to the advice available from DEHLG, the European Commission has published a number of documents which provide a significant body of guidance on the requirements of AA, most notably 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' (European Commission, 2001), which sets out the principles of how to approach decision making during the process.

3.1.1.2 These Irish and European guidelines have been followed in the preparation of this report. The following list identifies these and other pertinent guidance documents which have been adhered to:

- Office of the Planning Regulator (OPR) Practice Note: Appropriate Assessment Screening for Development Management (OPR, 2021);
- Communication from the Commission on the Precautionary Principle. Office for Official Publications of the European Communities, Luxembourg (European Commission, 2000);
- Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC. Office for Official Publications of the European Communities, Brussels (European Commission, 2001);

Sample

- Estuaries and Coastal Zones within the Context of the Birds and Habitats Directives - Technical Supporting Document on their Dual Roles as Natura 2000 Sites and as Waterways and Locations for Ports. European Commission (European Commission, 2009);
- Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities. Department of the Environment, Heritage and Local Government, Dublin (DEHLG, 2010a);
- Circular NPW 1/10 and PSSP 2/10 on Appropriate Assessment under Article 6 of the Habitats Directive – Guidance for Planning Authorities (DEHLG, 2010b). Department of Environment Heritage and Local Government;
- Guidance document on the implementation of the Birds and Habitats Directives in estuaries and coastal zones with particular attention to port development and dredging. European Commission (European Commission, 2011a);
- Guidance document: Wind Energy Developments and Natura 2000. European Commission (European Commission, 2011c);
- Marine Natura Impact Statements in Irish Special Areas of Conservation: A working document. National Parks and Wildlife Service, Dublin (NPWS, 2012);
- Interpretation Manual of European Union Habitats. Version EUR 28. European Commission (European Commission, 2013a);
- Guidelines on Climate Change and Natura 2000. European Commission (European Commission, 2013b);
- Guidance on Environmental Impact Statements and NIS Preparation for Offshore Renewable Energy Projects. Department of Communications, Climate Action and Environment (DCCAE, 2017);
- Notice C(2018) 7621 'Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC'. European Commission Office for Official Publications of the European Communities, Luxembourg (European Commission, 2019);
- 'A guide to the assessment of air quality impacts on designated nature conservation sites (Version 1.1)'. Institute of Air Quality Management (IAQM, 2020); and
- Notice C(2020) 7730 'Guidance document on wind energy developments and EU nature legislation'. European Commission Office for Official Publications of the European Communities, Luxembourg (European Commission, 2020).

3.2 Likely significant effect (LSE)

3.2.1.1 The European Commission's 2018 Notice (European Commission, 2019) advises that the AA procedure is triggered not by the certainty but by the likelihood of significant effects arising from plans or projects regardless of their location inside or outside a protected site. Such likelihood exists if significant effects on the site cannot be excluded. The significance of effects should be determined in relation to the specific features and environmental conditions of the site concerned by the plan or project, taking particular account of the site's COs and ecological characteristics. The requirement that the effect in question be 'significant' means that plans or projects that have no appreciable effect on the site are thereby excluded.

3.2.1.2 This SISAA document provides the relevant information to support the determining ('competent') authority in undertaking its assessment of LSE.

3.3 NIS Assessment Approach

3.3.1.1 The approach to this SISAA and subsequent NIS is based on the knowledge that both Project Design Options, as set out in Section 4, have been considered in all related environmental assessments for the Proposed Development, allowing for firm conclusions to be drawn as to which Project Design Option will have the potential to create the greatest significant effect.

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3.3.1.2 Where any variation in parameters between the two Project Design Options exists, this has been clearly defined. Additionally, where any difference in parameters between the two Project Design Options may lead to a change in conclusions this has also been set out.

3.4 Mitigation measure Consideration

3.4.1.1 In determining whether likely significant effects (LSE) may occur or can be excluded in the Stage 1 appraisal, measures intentionally introduced to avoid or reduce the adverse effects of the Proposed Development on European Sites, (i.e. "mitigation measures") have not been taken into account in this SISAA. This approach is consistent with EU guidance and the case law of the Court of Justice of the European Union (CJEU).

3.4.1.2 EC (2001) states that *"project and plan proponents are often encouraged to design mitigation measures into their proposals at the outset. However, it is important to recognise that the screening assessment should be carried out in the absence of any consideration of mitigation measures that form part of a project or plan and are designed to avoid or reduce the impact of a project or plan on a Natura 2000 site"*. This direction in the European Commission's guidance document is unambiguous in that it does not permit the inclusion of mitigation at screening stage.

3.4.1.3 In April 2018, the Court of Justice of the EU issued a ruling in case C-323/17 People Over Wind and Peter Sweetman v Coillte Teoranta ("People Over Wind") that Article 6(3) of Directive 92/43/EEC must be interpreted as meaning that, in order to determine whether it is necessary to carry out, subsequently, an AA of the implications, for a site concerned, of a plan or project, it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on that site.

3.4.1.4 The judgment in People Over Wind is further reinforced in EC (2019) which refers to CJEU Case C-323/17.

3.5 Consideration of *ex-situ* effects

3.5.1.1 EC (2019) advises that Member States, both in their legislation and in their practice, allow for the Habitats Directive Article 6(3) safeguards to be applied to any development pressures, including those which are external to European sites, but which are likely to have significant effects on any of them.

3.5.1.2 The CJEU developed this point when it issued a ruling in case C-461/17 ("Brian Holohan and Others v An Bord Pleanála") that determined *inter alia* that Article 6(3) of Directive 92/43/EEC must be interpreted as meaning that an AA must on the one hand, catalogue the entirety of habitat types and species for which a site is protected, and, on the other, identify and examine both the implications of the proposed project for the species present on that site, and for which that site has not been listed, and the implications for habitat types and species to be found outside the boundaries of that site, provided that those implications are liable to affect the COs of the site.

3.5.1.3 In that regard, consideration has been given in this SISAA to implications for habitats and species located both inside and outside of the relevant European Sites where effects upon those habitats and/or species are liable to affect the COs of the sites concerned.

3.6 Conservation objectives (COs)

3.6.1.1 The COs for each European Site are to maintain or restore the favourable conservation condition of the habitats and/or species for which the European Site has been designated.

3.6.1.2 The favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing;

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- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future; and
- the conservation status of its typical species is favourable.

3.6.1.3 The favourable conservation status (or condition, at a site level) of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

3.6.1.4 The most up-to-date COs for the European Sites being considered have been used in this SISAA. Details in relation to the QIs of SACs and SCIs of SPAs is based on publicly available data sourced from the relevant Statutory Nature Conservation Bodies in Ireland and other relevant states in May 2024.

3.7 Consideration of In-combination Effects

3.7.1.1 Article 6(3) of the Habitats Directive requires that in-combination effects with other plans or projects are also considered. As set out in the Commission's 2018 Notice (European Commission, 2019), significance will vary depending on factors such as magnitude of impact, type, extent, duration, intensity, timing, probability, cumulative effects and the vulnerability of the habitats and species concerned.

3.7.1.2 In that context, all elements of ABWP2 have been considered in combination. This entails the other individual components of ABWP2 other than the Proposed Development, including the ABWP2 Onshore Grid Infrastructure (OGI), the ABWP2 Operations and Maintenance Facility (OMF) and EirGrid Upgrade Works.

3.7.1.3 In addition, other plans or projects which are completed, approved but uncompleted, or proposed have been considered. EC (2019) specifically advises that "as regards other proposed plans or projects (i.e. other projects not proposed by the Applicant), on grounds of legal certainty it would seem appropriate to restrict the in-combination provision to those which have been actually proposed, i.e. for which an application for approval or consent has been introduced".

Sample

4 The Proposed Development

4.1 Location

4.1.1.1 The Proposed Development will be located on and around Arklow Bank, in the Irish Sea off the East coast of Ireland. The Proposed Development holds a Maritime Area Consent (MAC) which covers both the Array Area and Cable Corridor and Working Area. The Array Area and Cable Corridor and Working Area are shown in Figure 4.1 and described below.

4.1.2 Array Area

4.1.2.1 The Array Area is the area where the WTGs, the OSPs, and associated foundations and cables will be installed. These cables will comprise export, inter array and interconnector cabling and is delineated on the Location Map as presented in Figure 4.1.

4.1.2.2 Figures showing the site location (Figure 4.1) and proposed site layouts showing the extent of the range of turbines (Figure 4.2 and Figure 4.3) can be found below.

4.1.3 Cable Corridor and Working Area

4.1.3.1 The Cable Corridor and Working Area is the area where the export, inter array and interconnector cabling will be installed and is delineated on the Location Map as presented in Figure 4.1. This area will also facilitate vessel operations associated with installation of WTG and foundation structures within the Array Area.

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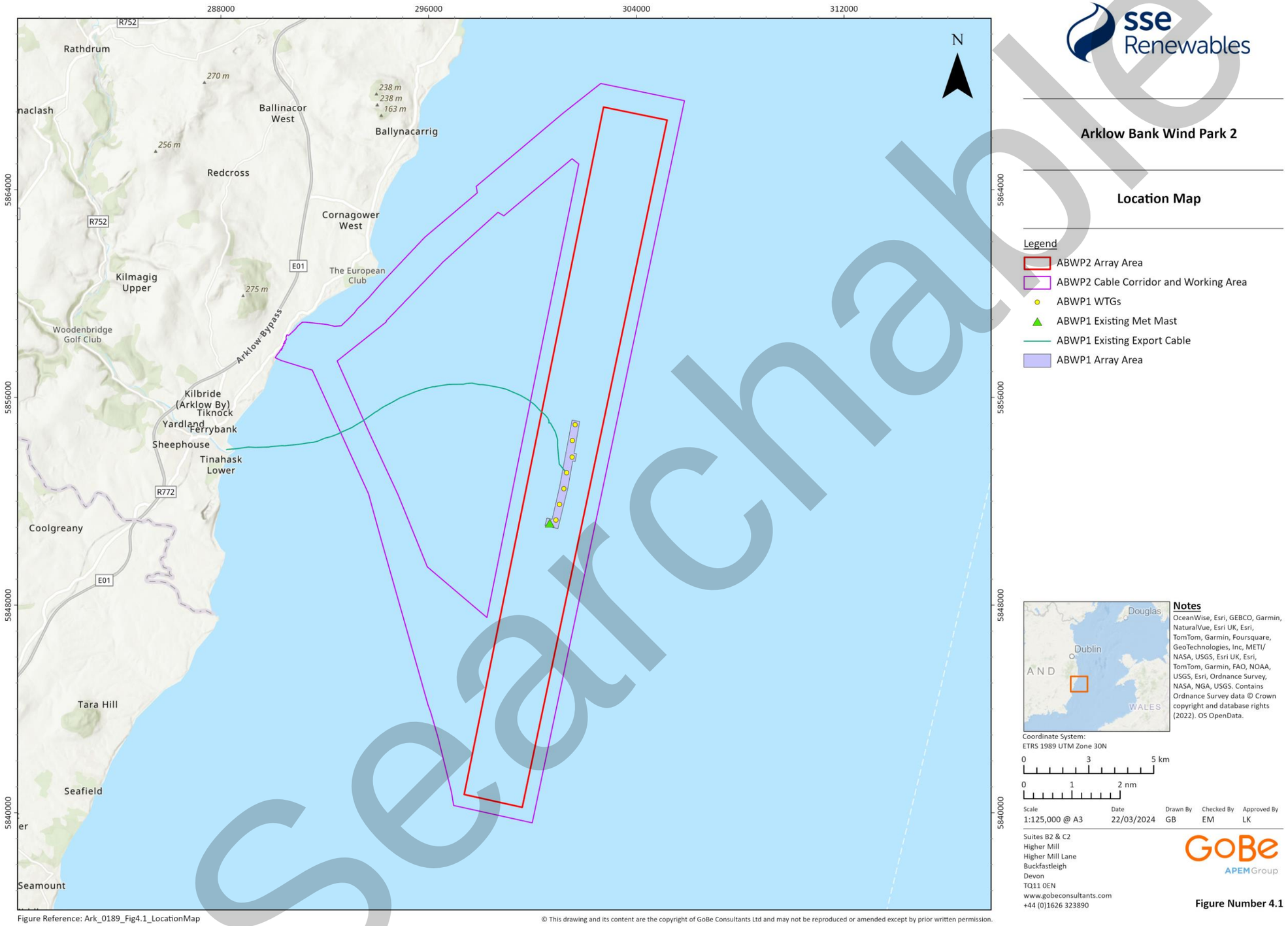
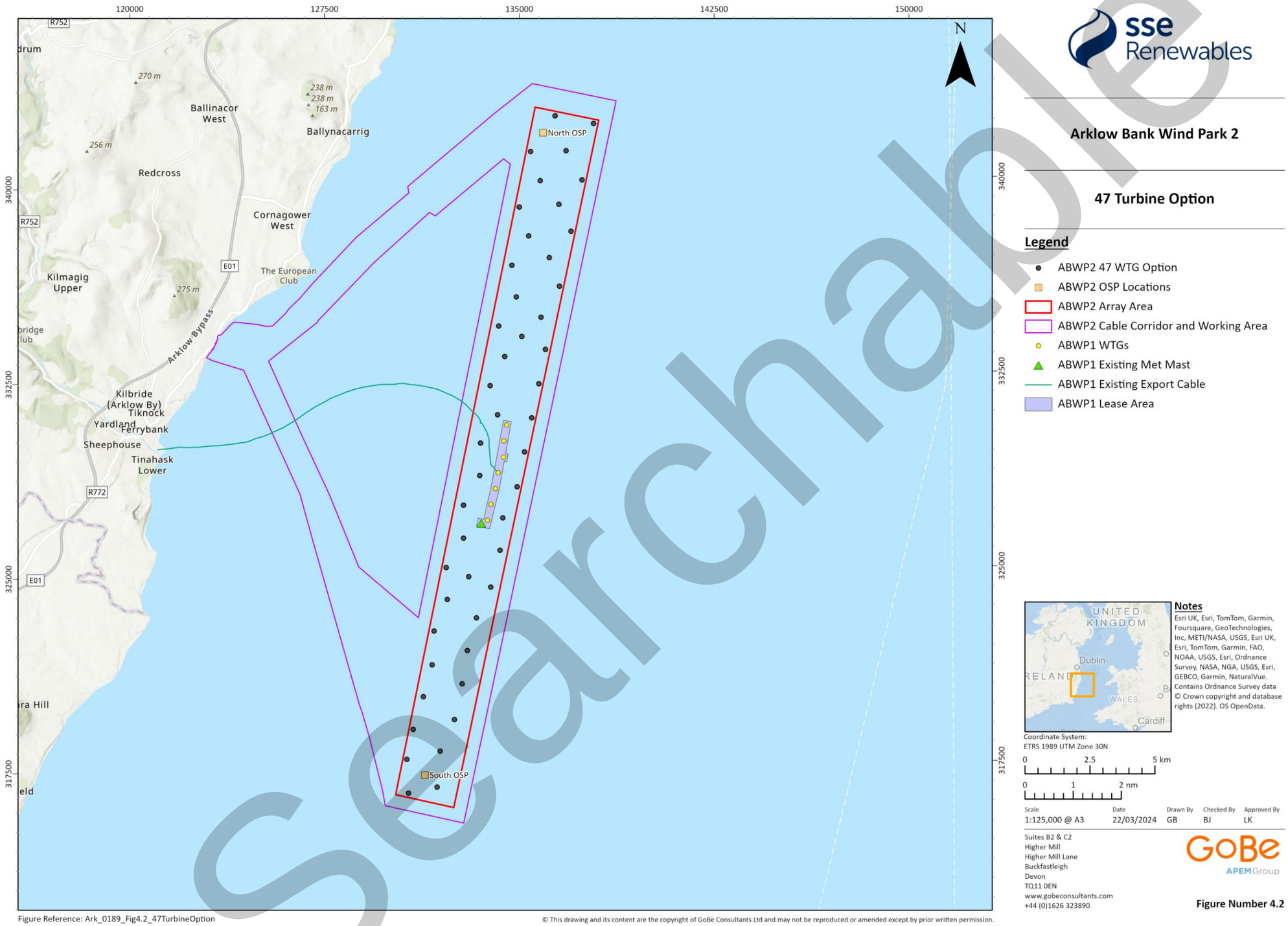


Figure 4.1: Location Map for the Proposed Development

Sample Search



sse Renewables

Arklow Bank Wind Park 2

47 Turbine Option

Legend

- ABWP2 47 WTG Option
- ABWP2 OSP Locations
- ABWP2 Array Area
- ABWP2 Cable Corridor and Working Area
- ABWP1 WTGs
- ABWP1 Existing Met Mast
- ABWP1 Existing Export Cable
- ABWP1 Lease Area

Notes

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Coordinate System:
ETRS 1989 UTM Zone 30N

0 2.5 5 km

0 1 2 nm

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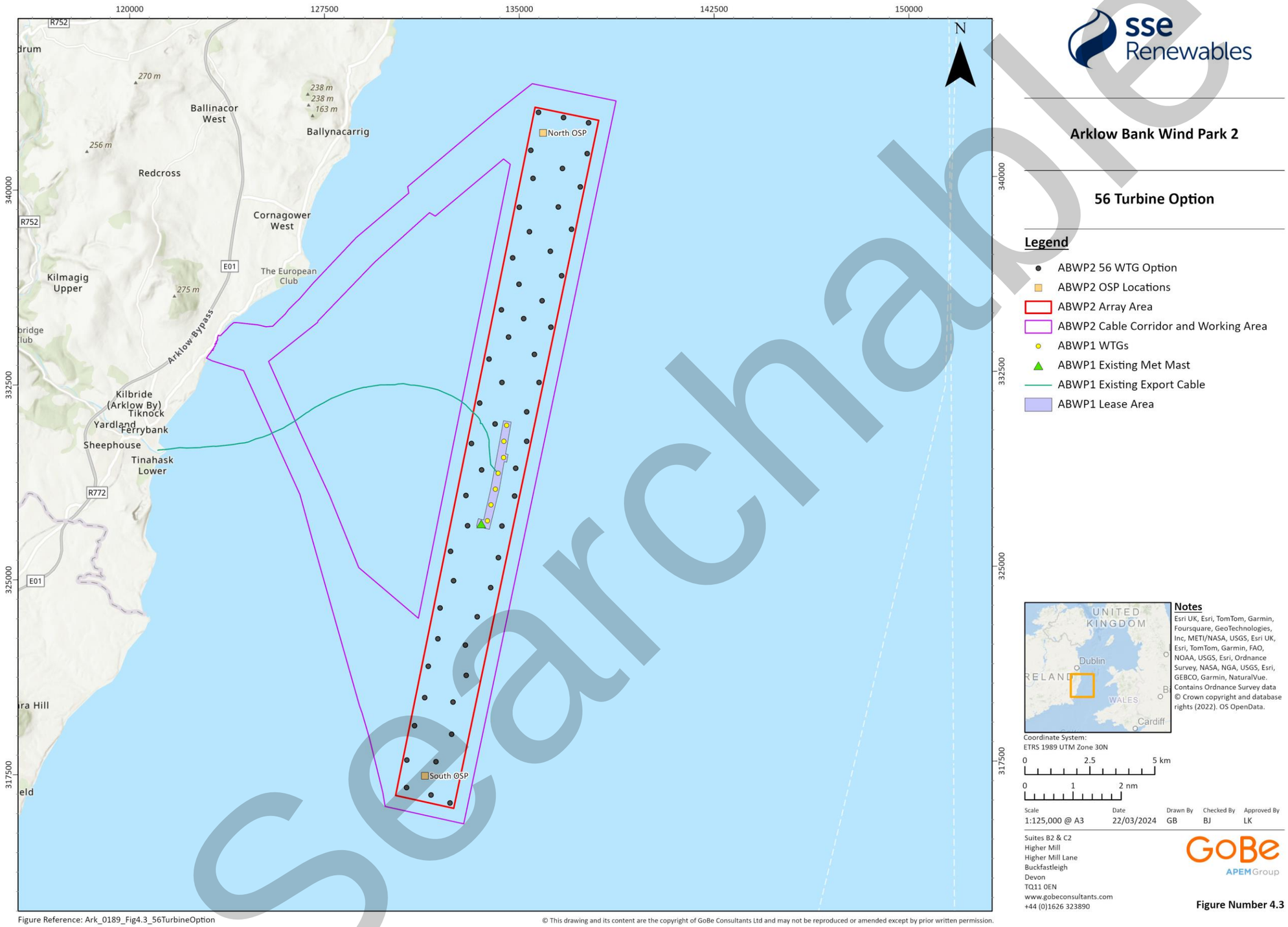
Figure Number 4.2

Figure Reference: Ark_0189_Fig4.2_47TurbineOption

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Figure 4.2: Arklow Bank Wind Park 2 Site Layout - 47 WTGs



sse Renewables

Arklow Bank Wind Park 2

56 Turbine Option

Legend

- ABWP2 56 WTG Option
- ABWP2 OSP Locations
- ABWP2 Array Area
- ABWP2 Cable Corridor and Working Area
- ABWP1 WTGs
- ABWP1 Existing Met Mast
- ABWP1 Existing Export Cable
- ABWP1 Lease Area

Notes

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Figure Number 4.3

Figure Reference: Ark_0189_Fig4.3_56TurbineOption

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Figure 4.3: Arklow Bank Wind Park 2 Site Layout - 56 WTGs

4.2 Overview of the Proposed Development

4.2.1.1 The proposed offshore infrastructure associated with ABWP2 will comprise all development seaward of the HWM. Consent is sought by the Developer to construct the Proposed Development in accordance with one of two discrete Project Design WTG Options (Table 4.1); combined with two OSPs and associated foundation and cabling systems (Table 4.2).

Table 4.1: Project Design Options (WTGs)

Component	Project Design Option 1	Project Design Option 2
Number of WTGs	56	47
Upper tip height above Lowest Astronomical Tide (LAT) (m)	273	287
Minimum lower blade tip height above (LAT) (m)	37	37
Rotor diameter (m)	236	250
Hub height above LAT (m)	155	162

Table 4.2: Project Design Options (OSPs)

Component	Project Design Option 1 and 2
Number of OSPs	2
Height of main structure above Lowest Astronomical Tide (LAT) (m)	53
Topside length (m)	46
Topside width (m)	33.5

4.2.1.2 Each WTG will comprise a tower section, nacelle and three rotor blades. The WTG foundations will be monopiles (MPs) and a network of inter-array cabling shall be used to transmit power from the WTGs to the OSPs. Each OSP will comprise a topside structure supported on a MP foundation. As there are two OSPs proposed, interconnector cables may be used to connect these to one another to improve the availability of the electrical system and to provide redundancy. Each OSP will be connected to an export cable, and these two offshore export cables will be installed in the Array Area and the Cable Corridor and Working Area presented in Figure 4.4 and will make landfall at Johnstown North, 4.5 km North of Arklow town. The Proposed Development will also include scour protection and cable protection.

4.2.1.3 The following sections provide a description of each component of the Proposed Development.

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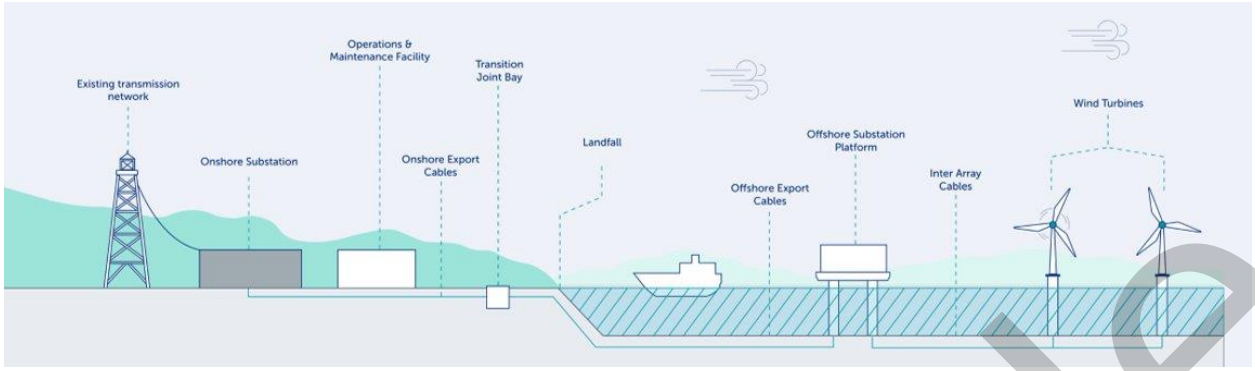


Figure 4.4 Main components of an offshore windfarm

4.2.2 Wind Turbine Generators (WTGs)

4.2.2.1 The Proposed Development will comprise either 56 or 47 WTGs. The WTG layouts for each Project Design Option have been developed to best utilise the available wind resource, suitability of seabed, environmental conditions and wake effects, while seeking to minimise environmental impacts and avoid site constraints.

4.2.2.2 A limit of deviation of up to 100m will be applied for the WTGs, OSP's and associated foundations. This is in order to adapt to site constraints during construction (e.g. ground conditions) and/or to avoid areas of sensitive habitat.

4.2.2.3 The WTGs for both Project Design Options will comprise three blades and a horizontal axis rotor. The blades will be connected to the hub, forming a rotor which turns a shaft connected either directly to the generator ('direct drive') or to a gearbox, which are located within the nacelle. The nacelle is supported by the tower and is able to yaw on the vertical axis in order to continually align the rotor with the oncoming wind direction.

4.2.2.4 The WTG towers will be coloured grey (RAL 7035), and the foundation structure will be coloured yellow (RAL 1023) to a minimum distance of 15 m above Highest Astronomical Tide (HAT) for navigation marking purposes.

4.2.2.5 The Project Design Options for the WTGs are presented in Table 4.3. Two WTG options are being considered as displayed in Figure 4.2 and Figure 4.3 above with associated parameters outlined in Table 4.3. The two WTG options comprise Option 1 (Model 1a or 1b) and Option 2. As shown in Table 4.3 below, Model 1a and 1b have the same rotor diameter, hub height, tip heights and layouts however, chord width and revolutions per minute (RPM) will vary slightly across the two models.

Table 4.3: WTG Infrastructure Parameters

Parameters	Option 1	Option 2
Hub Height (above LAT) (m)	155	162
Rotor Diameter (m)	236	250
Upper Blade tip height (above LAT) (m)	273	287
Lower Blade tip height (above LAT) (m)	37	37
Number of WTGs	56	47

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Parameters	Option 1		Option 2
Chord Width (m)	Model 1a	Model 1b	6.9
	5.4	6.8	
Average annual RPM	6.34	5.73	6.19

4.2.2.6 The WTGs will be accessed by personnel with their tools and equipment from either a vessel or a helicopter. Access by vessel will be facilitated by boat landing systems fixed to the WTG foundation, and external working platforms will be designed to allow 'walk-to-work' access directly from the vessel via gangway systems (section 4.4). The nacelle will have a helicopter hoist ('heli-hoist') area allowing access for personnel with their tools and equipment and for emergency rescue operations.

4.2.2.7 Each WTG will contain quantities of oils and fluids (such as lubricating oils, hydraulic oils, coolants) to support regular operations and maintenance activities. The types of oils and fluids include:

- Grease
- Synthetic Oil
- Hydraulic Oil
- Gear Oil
- Lubricants
- Nitrogen
- Water/Glycol
- Transformer Silicon/Ester oil
- Sulphur hexafluoride (SF6)
- Glycol/Coolants

4.2.2.8 Oils and fluids as listed above will be replaced as required during the operational and maintenance phase. In addition, petroleum fuels may be used to fuel temporary generators providing power to equipment and marine lighting during the construction, operational, maintenance and decommissioning phases.

4.2.3 Offshore Substations Platforms (OSPs)

4.2.3.1 The Proposed Development will require two OSPs comprising one OSP in the north and one OSP in the south of the Array Area (Figure 4.2 and Figure 4.3). The purpose of the OSPs is to transform the electricity generated by the WTGs (at 66 kV) to a higher voltage (220 kV), allowing the power to be efficiently transmitted to shore. Due to the distances of electricity transmission between the Proposed Development and the connection point at the Avoca River Park, the electricity generated will operate on an HVAC (high voltage alternating current) system.

4.2.3.2 The OSP topsides will contain switchgear, transformers, control equipment, auxiliary electrical equipment, cranes, batteries, generators, fire control systems and a communications mast. The OSP will comprise a platform with a number of decks, which will include a heli-hoist area. OSP topsides will generally be grey in colour, with the foundation structure painted yellow (RAL 1023) for navigation marking purposes. The OSP topside parameters are presented in Table 4.4.

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Table 4.4: OSP topside infrastructure parameters

Parameter	OSPs
Number of OSPs	2
Height of main structure above LAT (m)	53
Height of top of antennae structure above LAT (m)	63
Topside length (m)	46
Topside width (m)	33.5

4.2.3.3 The topside structure of the OSP will also provide access and emergency welfare facilities for personnel, as well as a lower deck where the inter-array, interconnector and offshore export cable hang-offs are located. The hang-offs will support the weight of the cables as they enter the underside of the OSP topside structure. The structures will be un-manned and will only have personnel on them during operation and maintenance activities. The topside structure of the OSP will have lightning protection in the form of rods and finials mounted on top of the antennae structure and other equipment and/or containers to ensure adequate lightning protection for the structure.

4.2.3.4 Each OSP will contain quantities of oils and fluids (such as lubricating oils, hydraulic oils, coolants). The types of oils and fluids required for the OSPs include:

- Diesel fuel[2]
- Transformer coolant oil
- UPS Batteries
- Biodegradable electrolyte
- Fire Suppression Systems
- HVAC Coolant
- SF6

4.2.3.5 The oils and fluids as listed above will be replaced as required during the operational and maintenance phase. In addition, diesel may be used to fuel temporary generators providing power to equipment during the construction, operational and maintenance and decommissioning phases.

4.2.4 Foundations

4.2.4.1 All WTG and OSP foundations will consist of steel monopiles.

4.2.4.2 For WTG foundations and the OSP foundations, a Transition Piece (TP) may be installed over the monopile acting as a structural interface between the monopile and WTG tower or OSP topside respectively. The TP for the WTG foundations, if employed, will include boat landing ladders (and rest platform if applicable), an external working platform, a davit crane and other ancillary components (i.e. communication antennae, navigational aids, identification signage, lighting etc). The TP for the OSP foundations will include support for the topside structure, a deck to facilitate cable pulling and access to the topside, boat landing systems (including rest platforms if applicable), davit cranes and other ancillary equipment. Alternatively for the WTGs, the monopile may be directly connected to the WTG tower, in which case the TP-less monopile would provide the same functionality as defined for the TP above, but with secondary steel components

[2] Diesel required to fuel standby/back-up generator.

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installed to the monopile offshore. For navigational purposes the upper sections of the foundation are coloured yellow (RAL 1023) to a minimum height of HAT +15 m.

4.2.4.3 Cathodic protection will be installed on each foundation. This may consist of subsea zinc or aluminium anodes, as is typical for offshore windfarms and other subsea structures. These are also known as 'sacrificial' anodes, as the anodes gradually dissipate and are diluted into the sea water, protecting the foundation. Alternatively, an Impressed Current Cathodic Protection (ICCP) system may be used or used in combination with sacrificial anodes. Other corrosion protection methods may also be used such as application of corrosion resistant coatings, inclusion of corrosion allowance or fabrication from non-metallic or corrosion resistant materials.

4.2.4.4 Scour protection will be installed around each foundation to prevent scour holes developing around the structures. Each foundation type and associated scour protection are considered below.

Monopile foundations

4.2.4.5 Monopile foundations consist of a single hollow steel tube installed at depth into the seabed. Monopile foundation parameters are presented in Table 4.5.

4.2.4.6 The monopile foundation parameters such as pile diameter and pile penetration depth will depend on location specific water depths and ground conditions, both of which are dynamic and will change with time, as a result these parameters will be confirmed at the time of construction and a range is presented below. The ranges required for the WTG and OSP monopile foundation parameters are set out in Table 4.5.

Table 4.5: Monopile foundation infrastructure parameters for WTGs and OSPs

Parameter	WTG	OSP
Pile diameter (m)	7-11	7-14
Pile penetration depth below Lowest Seabed Level (m)	20-37	20-45
Seabed footprint per pile (m^2)	38-96	38-154
Total seabed footprint for component type (m^2)	1,786-5,380	76-310

4.2.5 Scour protection

4.2.5.1 As stated above, scour protection will be installed around the foundations to prevent the development of scour holes. In the absence of scour protection, scour holes may develop due to the localised increase in flow rates experienced in the immediate vicinity of a structure.

4.2.5.2 Scour protection 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-tube 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;
- 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 pre-attached to the mesh base;

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- Rock bags: open mesh bags comprising rope fabric, which contains elements of recycled plastic. Mesh bags are currently sized up to 12 tonnes in weight per bag and are filled with a loose mix of varying sized rocks. These bags are placed in concentric rings of overlapping rock bags; and
- Geotextile Sand Containers: as per rockbags, but instead a geotextile fabric bag is filled with sand instead of rock. A geometric overlay / material that is applied to the outer of the monopile, that acts to reduce accelerated and turbulent flow, hence reducing scour.

4.2.5.3 The type, design and quantity of the scour protection to be installed will depend on the monopile foundation diameter and will take into account factors such as seabed conditions, currents and water depth. Scour protection parameters for monopiles are presented in Table 4.6.

Table 4.6: Scour protection infrastructure parameters

Parameter	WTG's	OSPs
Height (m)	0.5-3	0.5-3
Radius (m)	14-39	14-49
Area per foundation requiring scour protection (m^2)	615-4,779	615-7,543
Volume per foundation (m^3)	307-14,337	307-22,629
Total volume for component type (m^3)	14,429-802,872	614-45,258

4.2.6 Subsea Cables

4.2.6.1 The total lengths, burial depths and routing of inter array, export and interconnector cabling required will depend upon the final WTG and OSP locations (within the WTG and OSP limits of deviation) as well as site constraints such as wrecks, sensitive habitats and difficult ground conditions such as stiff clays and shallow rock. A range for the lengths and the burial depths are presented in the respective sections below.

4.2.6.2 The Developer will seek to bury the cables to ensure the cables are adequately protected from activities such as anchoring and fishing. Ground conditions such as shallow rock, boulders or stiff clays may prevent the cable installation equipment reaching adequate burial depth. In areas where adequate burial depth has not been achieved the cables will require additional protection and these parameters are outlined in Table 4.8.

Inter-array cables

4.2.6.3 Inter-array cabling (66 kV HVAC) will connect each WTG to an OSP and in some cases via other WTGs. The proposed cable will consist of a cross-linked polyethylene (XLPE) insulated aluminium or copper conductor submarine cable and will contain fibre optic cores. Each submarine cable will consist of a three-core cable (i.e. three electrical conductors within the one cable) and fibre optic cores.

4.2.6.4 The width of seabed disturbance from the installation tool is anticipated to be 15 m resulting in a total area of seabed disturbed from inter array cable installation of 1,830,000 m^2. Inter-array cable parameters are presented in Table 4.7.

Table 4.7: Inter-array cable infrastructure parameters

Parameter	Value
Voltage (kV)	66

Scoping

Parameter	Value
Transmission system	HVAC
Total length (km)	110-122
Burial depth (m) below lowest seabed level	0 -1.5

Interconnector Cable

4.2.6.5 Due to the installation of two OSPs, an interconnector cable may be required to connect the OSPs to each other to provide redundancy and improve the availability of the electrical system. The cable will consist of either XLPE insulated aluminium or copper conductor submarine cable and will contain fibre optic cores.

4.2.6.6 The width of seabed disturbance from the installation tool is anticipated to be 15 m resulting in a total area of seabed disturbed from interconnector cable installation of 420,000 m^2. Interconnector cable parameters are presented in Table 4.8.

Table 4.8: Interconnector cable infrastructure parameters

Parameter	Value
Number of cable circuits	1
Voltage	220 kV
Transmission system	HVAC
Total length (km)	25 – 28
Burial depth (m below lowest seabed level)	0-2.5

Offshore export cables

4.2.6.7 Two offshore export cable circuits will be installed to transmit the electricity generated by the WTGs from the OSP's to the landfall at Johnstown North. Each circuit consists of three cores and fibre optic cores, together in a single subsea cable. The offshore export cable circuits will be routed within the Array Area and Cable Corridor and Working Area. At the landfall, the offshore export cables will be connected to the consented ABWP2 Onshore Grid Infrastructure (OGI) landward of the HWM.

4.2.6.8 The width of seabed disturbance from the installation tool is anticipated to be 15 m resulting in a total area of seabed disturbed from export cable installation of 600,000 m^2. Export cable parameters are presented in Table 4.9.

4.2.6.9 As the export cables approach the landfall area and transits onshore using trenchless techniques, different installation parameters apply and are outlined in Table 4.18.

Table 4.9: Offshore export cable infrastructure parameters

Parameter	Value
Number of cable circuits	1
Voltage (kV)	220
Transmission system	HVAC
Total length (km)	35-40
Burial depth (m below lowest seabed level)	0 – 2.5

4.2.7 Cable protection

4.2.7.1 Cables will be buried to depths as set out in Table 4.7, The width of seabed disturbance from the installation tool is anticipated to be 15 m resulting in a total area of seabed disturbed from

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interconnector cable installation of 420,000 m^2. Interconnector cable parameters are presented in Table 4.8.

4.2.7.2 Table 4.8, and Table 4.9 for inter-array, interconnector, and offshore export cables, respectively. However, there are four scenarios where cable burial will not be possible. These scenarios are as follows:

- Where the cable leaves the seabed and enters the J-tube attached to/cable entry hole on the WTG or OSP substructure;
- At cable crossings (paragraph 4.2.5.15 et seq.);
- Difficult ground conditions preventing adequate cable burial. Difficult ground conditions can comprise stiff clays, glacial tills, exposed bedrock or areas of significant seabed mobility which may limit the installation tools achieving target burial depths; and
- Where the cable leaves the duct from the landfall and transitions from the exit pit to burial.

4.2.7.3 Where cable burial is not possible external cable protection is installed to prevent movement or exposure of the cables over the lifetime of the Proposed Development. This will protect cables from other activities such as fishing or anchor placement, dropped objects, and limit the effects of heat and/or induced magnetic fields. Cable Protection is external armouring applied to exposed cables or used at cable crossings, typically comprising;

- Cable Protection system (CPS) or Ducting; (polyurethane, steel, High Density Polyethylene (HDPE), cast iron or plastic);
- Concrete mattresses ; and
- Rock Installation; (berms or bags).

4.2.7.4 The appropriate solution for external protection will depend on seabed conditions along the route as well as reflecting the specific risks presented to the cables considering level of scouring, seabed mobility, vessel activity, nearby infrastructure, and installation methodology. Cable protection parameters, applicable to inter-array, interconnector and offshore export cables, are presented in Table 4.10.

Table 4.10: Cable protection infrastructure parameters

Parameter	Offshore Export Cables	Inter-Array Cables	Interconnector Cable
Type	Combination of rock installation, concrete mattress, rock bags		
Height (m)	0-1.5	0-1.5	0-1.8
Width (m)	0-8	0-8	0-10
Maximum Percentage of length of cables requiring cable protection (%)	20	15	50
Maximum Length of cables requiring cable protection (m)	8,000	18,300	14,000
Total maximum footprint of cable protection (m2)	64,000	146,400	140,000
Total maximum volume of cable protection (m3)	96,000	219,600	252,000

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Cable Protection Systems or Ducting

4.2.7.5 CPS can consist of concrete, polyurethane, steel, cast iron shells, HDPE or plastic ducts or a mixture of materials. The CPS can either be assembled around the cable on the vessel during the cable lay campaign or pre-installed on the WTG or OSP foundation and the cables pulled through during the cable installation campaign. CPS are usually used to protect the free span of cable before entering the WTG and OSP foundation apertures. CPS may also be used to complete cable crossings (see paragraph 4.2.5.21 et seq.) and is usually stabilised with rock protection.

Concrete Matressing

4.2.7.6 Concrete mattresses are constructed using high strength concrete blocks and U.V. stabilised polypropylene rope. They are typically supplied in standard 6 x 3 x 0.3 m units of standard density, however modifications to size, density, and shape (tapered edges for high current environments, or denser concrete) can be engineered bespoke to the locality.

4.2.7.7 The mattresses can be installed over the cables with a standard Dynamic Positioning (DP) vessel and installation frame. The mattresses are lowered to the seabed and once the correct position is confirmed, a frame release mechanism is triggered and the mattress is deployed on the seabed. This single mattress installation is repeated for the length of cable that requires protection. The mattresses may be gradually layered in a stepped formation on top of each other dependent on local conditions and expected scour. Concrete mattressing can be used for cable protection and at cable crossings (paragraph 4.2.5.21 et seq.).

Rock Installation

4.2.7.8 Rock installation over cables to provide additional protection is carried out either by creating a berm or by the use of rock bags.

4.2.7.9 Rock installation is achieved using a vessel with equipment such as a ‘fall pipe’ which allows for installation of rock onto the seabed. Rock installation will be a maximum of 1.5 m in height above the inter array and export cable and a maximum of 1.8 m in height above the interconnector cable, generally with a 3:1 gradient and a maximum 3 m in height above cables as they approach WTG and OSP foundations. This shape is designed to stabilise the cable as well as provide protection from anchor strike and anchor dragging, and to allow over trawl by fishing vessels. The cross section of the berm may vary dependent on local conditions and expected scour. The length of the berm is dependent on the length of the cable which requires protection.

4.2.7.10 Alternatively, pre-filled rock bags can be placed above the cables with specialist installation beams. Rock bags consist of various sized rocks contained within a rope or wire net. Similar to the installation of the concrete mattresses, they are lowered to the seabed and, when in the correct position, are deployed on to the seabed. Each rock bag will have a maximum height of 1.5 m. Rock placement can be used for cable protection and at cable crossings (see paragraph 4.2.5.21 et seq.). The number of rock bags required is dependent on the length of cable which requires protection.

4.2.8 Cable crossings

4.2.8.1 Cable crossings may be required where cables associated with the Proposed Development cross each other and/or the existing Arklow Bank Wind Park 1 (ABWP1) export cable. This will be facilitated by the installation of standard cable crossing designs, likely to be comprised of rock installation, concrete mattress and /or CPS as described for cable protection above. Cable crossing parameters are presented in Table 4.11. Further description of the crossing methodology is described in section 4.4 below.

4.2.8.2 The preferred solution for cable crossings will depend on seabed conditions along the route and crossing methodology, therefore ranges are presented below.

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Table 4.11: Cable crossing infrastructure parameters

Parameter	Cable Crossings
Crossing material	Rock installation, concrete mattressing and / or CPS
Height (m)	0.5-2.5
Width (m)	5-16
Length of crossing (per crossing) (m)	50-500
Footprint of 3 x cable crossings (m2)	750-24,000
Total volume of cable crossings (m3)	375-60,000

4.2.9 Installation vessels and helicopters

4.2.9.1 A range of installation vessels will be used for the construction of the Proposed Development. This includes main installation vessels (e.g. jack-up barges or dynamic positioning (DP) vessels with heavy lifting equipment), support vessels (including 'walk to work' vessels), tugs and anchor handlers, cable installation vessels, guard vessels, survey vessels, crew transfer vessels and scour/cable protection installation vessels. In addition, it is possible that helicopters will be used for crew transfers. Installation vessel and helicopter parameters are presented in Table 4.19 for activities associated with the installation of WTG and OSP infrastructure within the Array Area and in Table 4.20 for activities associated with site preparation and the installation of cables. These tables also provide an overview of the number of vessels/helicopters which will be on site at any one time, and the number of return trips across the entire construction period. It should be noted that these numbers are presented are anticipated likely numbers for assessment purposes and in reality, vessel and helicopter numbers are likely to be considerably less than this. The anticipated likely return trips per year numbers are provided in Table 4.21. The anticipated return trips per year will not always directly equate to the average yearly trips multiplied by the construction period. For example, all trips for a given vessel/craft type may be contained within a period that is shorter than the complete construction period, with the vessel not used outside of this period.

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Table 4.12: Total installation vessels anticipated on site at one time

Total Installation Vessels (on site at one time)	WTG	Site Prep	WTG Foundation	OSP Topside	OSP Foundation	IAC	Export Cables	Landfall	Total
Main Installation Vessels (Jack-up Barge/DP vessel)	1		2	1	1	1	1		**7**
Cargo barge			2	1					**3**
Support vessels (SOV / W2W / Commissioning JUVs)	1		1	1		2	1		**6**
Tug/Anchor Handlers			4	4	4			2	**10**
Cable Installation Vessels						1	1	2	**4**
Guard Vessels	2		2			2	2		**8**
Survey Vessels			1			2	1	2	**6**
Crew Transfer Vessels	2		2	2	1	2	2	1	**12**
Scour/Cable Protection Installation Vessels			1		1	1	2		**5**
Helicopters	1		1			1			**3**
Pre-installation boulder removal/clearing vessels		1				2	2		**5**
Seabed lowering/feature clearance vessel		1				1			**2**

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Total Installation Vessels (on site at one time)	WTG	Site Prep	WTG Foundation	OSP Topside	OSP Foundation	IAC	Export Cables	Landfall	Total
UXO clearance vessel		1							**1**

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Table 4.13: Total anticipated installation vessel return trips during construction

Installation Vessel Movements (Return Trips) (across construction period)	WTG	Site Prep	WTG Foundation	OSP Topside	OSP Foundation	IAC	Export Cables	Landfall	Total
Main Installation Vessels (Jack-up Barge/DP vessel)	37	0	74	10	10	10	5	5	**151**
Support vessels (SOV / W2W / Construction Support Vessels (CSV) / Commissioning JUVs)	68		68	20	0	136	34		**326**
Tug/Anchor Handlers			222	12	12			10	**256**
Cable Installation Vessels						10	5	5	**20**
Guard Vessels	158		158	20	4	136	68	17	**561**
Survey Vessels			73			10	5	30	**118**
Crew Transfer Vessels	822		822	210	14	180	180	40	**2268**
Scour/Cable Protection Installation Vessels			46		2				**48**
Helicopters	79		79			136			**294**
Pre-installation boulder removal/clearing vessels			73			79	79		**231**

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Installation Vessel Movements (Return Trips) (across construction period)	WTG	Site Prep	WTG Foundation	OSP Topside	OSP Foundation	IAC	Export Cables	Landfall	Total
Seabed lowering/feature clearance vessel						79	79		**158**
UXO clearance vessel		13							**13**

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Table 4.14: Total anticipated installation vessel return trips per year

Installation Vessel Movements (Return Trips) (per year)	Total
Main Installation Vessels (Jack-up Barge/DP vessel)	**76**
Support vessels (SOV / W2W / Commissioning JUVs)	**163**
Tug/Anchor Handlers	**128**
Cable Installation Vessels	**10**
Guard Vessels	**281**
Survey Vessels	**48**
Crew Transfer Vessels	**908**
Scour/Cable Protection Installation Vessels	**20**
Helicopters	**118**
Pre-installation boulder removal/clearing vessels	**93**
Seabed lowering/feature clearance vessel	**64**
UXO clearance vessel	**6**

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4.2.9.2 Jack-up vessels/barges make contact with the seabed when their jack-up spud cans (base structure of each leg) are lowered into place. Total impacted area during construction is dependent on the chosen installation vessel and associated spud can dimensions and number of legs, therefore for the purposes of the EIAR anticipated jack-up vessel parameters are presented in Table 4.15 below.

Table 4.15: Anticipated jack up vessel footprints.

Jack-up Barge Footprints	
Number of legs per vessel (total spud can/leg area will be largest with a 4-legged jack up barge)	3/4/6
Combined leg area (m^2)	1200
Leg penetration range (m)	0-20
Total Impacted Area during Construction (m^2)	278,400

4.3 Construction

4.3.1 Health and Safety

4.3.1.1 All project personnel and contractors will be required to be fully compliant with their responsibilities as defined by:

- The Safety, Health and Welfare at Work Act 2005;
- The Safety, Health and Welfare at Work (General Application) Regulations 2007 (as amended);
- The Safety, Health and Welfare at Work (Construction) Regulations 2013 (as amended);
- The Safety, Health and Welfare at Work (Diving) Regulations 2018 (as amended);
- The Safety, Health and Welfare at Work (Reporting of Accidents and Dangerous Occurrences) Regulations 2016 (S.I. No. 370 of 2016);
- The European Communities (EC) Act 1972 and related Regulations;
- The Chemicals Act 2008 and The Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001 (S.I. No. 619/2001) as amended;
- The Merchant Shipping Act 1894 & The Merchant Shipping (Investigation of Marine Casualties) Act, 2000
- The Health & Safety Authority (HSA) Approved Codes of Practice (ACoPS) and Guidance publications
- Wind Energy Ireland ACoPS and Guidance publications
- G+ Offshore Wind Health & Safety Association guidance documents
- Code of practice for safe use of cranes BS 7121-1:2016
- Other applicable industry standards/best practice such as ISO, DNV, etc

4.3.2 Methodology

4.3.2.1 The Proposed Development is proposed to be constructed according to the general sequence below, although the final sequence may vary from this;

- Step 1 – As detailed in section 4.1 confirmatory surveys;
- Step 2 – Seabed preparation;
- Step 3 – Foundation installation and scour protection installation;

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- 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 and interconnector cable installation and cable protection installation; and
- Step 8 – WTG installation/commissioning and post completion surveys.

4.3.2.2 Each stage is outlined in further detail in the following sections.

Step 1 – Confirmatory surveys

4.3.2.3 A number of surveys will commence before the construction phase, prior to installation of the offshore infrastructure. Surveys may also be carried out during the construction phase in advance of specific activities such as jack-up vessel deployment. Surveys will include those as outlined in Table 4.16.

4.3.2.4 The geophysical surveys will be carried out on a survey vessel whereas the geotechnical surveys will be undertaken on either a jack-up barge or DP vessel. A small jack-up vessel will be used for works in the nearshore/intertidal area.

4.3.2.5 In the event that potential Unexploded Ordnances (UXO) are identified through magnetometer survey activities, all efforts will be undertaken to avoid them. Should avoidance not be possible, those identified will be further investigated by a Remotely Operated Vehicle (ROV) or specialist divers and avoided where possible by the Proposed Development infrastructure and associated installation activities. The following methodologies are considered for UXO avoidance/clearance:

- avoid and leave in situ;
- relocation of UXO to avoid detonation;
- low order detonation (e.g. deflagration); and
- high order detonation.

4.3.2.6 Annex I reef and mussel bed surveys will also take place pre-construction. This will include analysis of geophysical survey data and drop-down video survey if required to confirm the presence, extent, distribution and quality/condition of any reef habitats or seed mussel beds.

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Table 4.16: Anticipated Confirmatory Surveys

Item	Survey Type		Description	Location
1	Geotechnical	Boreholes x 131	A borehole is a method of drilling into the seabed to recover samples and enable downhole geotechnical testing to be completed. A drilling head is lowered to the seabed via a drill string and potentially stabilised using a seabed frame if required. The drill string is then rotated to commence boring. Tools are lowered into the drill string to recover samples or conduct in-situ soil testing such as downhole CPTs. Downhole geophysical tools will be used post completion of the borehole for further data collection. Boreholes may be up to 80 m deep within the Array Area.	To be deployed at WTG Substructure, Inter Array and Export Cable and Jack-Up locations across the Array Area and Cable Corridor & Working Area.
		Cone Penetration Tests (CPTs) x 431	CPTs are a method for measuring the soils strength and stiffness parameters using a rod-shaped tool whose end has the shape of a cone with a known apex angle (e.g. 60 degrees) which is pushed at a constant speed into the soil. CPTs can be performed in seabed mode, down-hole mode or as a seismic CPT.	To be deployed at WTG Substructure, Inter Array and Export Cable and Jack-Up locations across the Array Area and Cable Corridor & Working Area.
		Vibrocore x 300	Vibrocore is a method of collecting un-consolidated seabed samples. A vibrocorer is lowered onto the seabed, position and depth are noted, after which the vibrocoring process is started. Upon refusal or at target depth, the stop condition is recorded and the vibrocorer is recovered on deck where the recovery rate is measured.	To be deployed at Inter Array and Export Cable locations across the Array Area and Cable Corridor & Working Area.
		Grab Samples x 240	Benthic grab sampling will be carried out by lowering a lightweight sampling device from the vessel, either by crane or handheld device depending on requirements. Upon returning grab samples to the deck, material will be sieved, examined and	To be deployed at Inter Array and Export Cable locations across the Array Area and

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Item	Survey Type		Description	Location
			logged and then stored in a suitable medium in a sealed container for a comprehensive laboratory analysis on land.	Cable Corridor & Working Area.
2	Geophysical	Multibeam Echosounder (MBES)	MBES is a system for collecting detailed topographical data of the seabed. The MBES system will be hull mounted. The equipment will operate within frequency of 200 – 700 kHz and with sound pressure levels in the range of typically 213 - 225dB re1µPa @1 m (rms).	Array Area and Cable Corridor & Working Area
		Side Scan Sonar (SSS)	SSS surveys are used to determine sediment characteristics and seabed features and provides detailed imagery of the seabed. SSS is typically towed behind the vessel on an armoured tow cable. However, some models may be pole mounted on the side of the vessel. This device will have a potential operating frequency range of approximately 100/900 kHz in the offshore area with and 540/850 kHz in the shallower nearshore area with sound pressure levels of up to 210dB re1µPa @1 m (rms).	Array Area and Cable Corridor & Working Area
		Gradiometer/Magnetometer	A magnetometer is a passive device that is towed behind a survey vessel. It is used to identify magnetic anomalies and hazard mapping for metal obstructions, shipwrecks and unexploded ordnance on the surface and in the shallow subsurface. The magnetometer does not emit any sound waves into the marine environment.	Array Area and Cable Corridor & Working Area
		Sub-Bottom Profiler (SBP)	SBP is used to develop an image of the subsurface, identifying different strata encountered in the shallow sediments. This device will have a primary and secondary frequency range of 0.5 – 15 kHz and sound pressure levels of up to 245 dB re1µPa @1 m (rms), which would be used in both nearshore and offshore areas. The boomer, with sound pressure levels in the range of 208-215dB re1µPa @1 m (rms) would be used in the nearshore shallower areas while the sparker system used in sub-bottom profiling, with sound pressures in the range of 204-219dB re1µPa @1 m (rms).	Array Area and Cable Corridor & Working Area

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Item	Survey Type		Description	Location
		Seismic Refraction/Reflection (2D/3DUHRS)	A seismic source is used to carry out a seismic survey which can be described as a chamber of compressed air that is released rapidly into the surrounding water to create an acoustic pulse. An air gun is the most commonly used source because the pulses are predictable, repeatable and controllable, it uses compressed air which is cheap and readily available. The seismic source system will have an expected operating frequency range of approximately 1-1000 Hz with sound pressure levels of up to 224dB Peak re1µPa @1 m (rms).	Array Area and Cable Corridor & Working Area
3	Metocean	Floating LiDAR	Floating LiDAR buoys will be deployed to measure the wind resource within the Array Area. Deployment of these buoys will include anchor points on the seabed.	Array Area
		Acoustic Doppler Current Profiler (ADCP)	ADCPs will be used to examine wave and current conditions. This equipment is installed on the seabed and anchored with a suitable mooring structure. It is generally a short-term deployment used to gather seasonal data (e.g. winter storm data) however may be deployed for longer.	Array Area
		Wave Buoy	Wave rider buoys may be deployed to measure wave heights within the Array Area. They will be moored to the seabed by a suitably sized mooring structure.	Array Area
4	Environmental	Benthic Ecology (subtidal benthic survey)	This survey is designed to confirm the predicted benthic communities and habitats at the site. Subtidal sample locations may be subject to drop down video in advance of sampling.	Array Area and Cable Corridor & Working Area
		Cetacean Porpoise Detectors (CPOD) / Sound Traps	Marine mammal acoustic monitoring will be undertaken using CPODs (click detectors). If used, the CPODs will be deployed on the seabed. Sound Trap hydrophones may be deployed alongside the CPODs for periods throughout the site survey campaign.	Array Area and Cable Corridor & Working Area
		Habitat Surveys (Sabellaria & Mussel Beds)	The data from the confirmatory Geophysical Surveys will be assessed by a benthic ecologist to identify potential habitat	Array Area and Cable Corridor & Working Area

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Item	Survey Type		Description	Location
			locations and inform the transect locations for drop down camera surveys if required. The Drop down camera surveys (video and images) will confirm if the predicted benthic communities and habitats are present within the boundaries of the Proposed Development. A benthic ecologist will be on board the vessel carrying out the drop down camera survey. The drop down camera survey will be carried out in suitable metocean conditions in order to mitigate against the risk of poor visibility / image quality. The drop down camera survey will be carried out a maximum of 18 months in advance of commencement of construction due to the mobile nature of the habitat.	
5	Corrosion	Microbial Induced Corrosion Frames	Microbial Induced Corrosion Frames are metal frames used to measure the rate of deterioration of a metal by corrosion processes that occurs directly or indirectly because of the metabolic activity of microorganisms in cold water systems. This type of corrosion results in severe pitting of metals, leading to rapid failures. The type of bacteria that cause this type of corrosion are anaerobic, they can only thrive in oxygen-deprived regions under deposit (Ibraheem, 2011). The outcome of this monitoring will feed into the turbine and OSP foundation design and allow suitable protection measures to be employed to prevent microbial induced corrosion of the turbine infrastructure.	Array Area
6	Sediment Dynamics	Benthic Flume & Benthic Lander	Benthic flumes and benthic landers are marine instruments which collect measurements on sediment transport processes and parameters directly in the sea. Benthic flumes collect information on entrainment-deposition parameters and the sediment transport rate coefficients which can be fed into the sediment transport model to improve the parameterisation of these variables within the model. Benthic landers are intermediate scale seabed frames equipped with sensors such as ADCP's, single point current meters, turbidity sensors and marine altimeters to measure seabed	Array Area and Cable Corridor & Working Area

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Item	Survey Type		Description	Location
			sediment transport. They provide an open area beneath an upper frame in which sensors are suspended and provide improved measures specifically of near bed hydrodynamic and sedimentary processes.	
7	ROV - Post-installation / as-built / O&M	MBES, General Visual Inspections (GVI), Non – Invasive Visual Inspections, Cable Depth of Lowering Surveys	Using a Remotely Operated Vehicle(s) to carry out post installation / as built / O&M surveys for export / IAC / interconnector cables, these could include: MBES, General non-invasive visual inspections and cable depth of lowering surveys with pipeline/cable tracking equipment. These systems monitor or induce magnetic fields in the cable which are then used to determine cable position and vertical displacement. These may take place at cable crossings, substructure base inspections, cathodic protection systems and any planned/remedial rock dumping that may take place.	Array Area and Cable Corridor & Working Area

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Step 2 – Seabed preparation

4.3.2.7 Seabed preparation activities will be required in advance of installation activities, and in advance of jack-up vessel placement, to reposition any boulders/debris and to clear seabed features from the seabed. This will include boulder clearance, seabed lowering/feature clearance followed by a pre-lay grapnel run, as described below.

BOULDER CLEARANCE

4.3.2.8 Boulder clearance is commonly required during Offshore Windfarm (OWF) cable route and site clearance. Cable routes, WTG and OSP positions will be designed to avoid known boulder locations where possible, the entire route and each WTG position will be surveyed for boulders and where required the boulders will be cleared, likely in multiple discrete locations. A boulder is typically defined as being over 200 mm in diameter/length Boulder clearance will be required in order to avoid risk to infrastructure during installation activities and to ensure stability for the jack-up vessel. If boulder clearance is required the boulder clearance width shown in Table 4.17 will depend on presence and size of boulders as well as installation spread and seabed conditions.

Table 4.17: Anticipated boulder clearance removal limits

	Offshore Export Cables & OSPs	Inter-Array Cables & WTGs	Interconnector Cable
Boulder clearance width (m)	15	15	15
Total footprint of boulder clearance (m2)	600,000	1,830,000	420,000

** Note that the area of seabed will be the same area subsequently impacted by seabed lowering / clearance and installation activities.*

4.3.2.9 Typically, boulder clearance will involve the use of a ROV to survey the construction area to identify any boulders, followed by deployment of a grab or plough to remove and relocate localised boulders. Where extensive boulders exist a boulder plough will be used to push boulders aside and clear the route for cable installation activities. Boulder ploughs are specialised tools used to prepare the seabed for cable installation. They are towed along the seabed using dynamically positioned vessels, employing a seabed surface plough to displace any surface boulders along the cable route. This provides for a clear path for safe cable installation.

SEABED LOWERING/FEATURES CLEARANCE

4.3.2.10 Given seabed levels can vary on the Arklow Bank, local seabed lowering in the vicinity of foundations and cables may be required so as to ensure they can be installed at the required design seabed level. Furthermore, seabed features, including mobile sand waves, are present on the Arklow Bank. Seabed features clearance will therefore be required in the vicinity of the foundations and along the inter-array, interconnector and offshore export cable routes, to create a relatively flat surface for the installation of infrastructure (and associated installation tools and equipment) and to ensure that cables are buried and protected sufficiently under mobile features for the lifetime of the Proposed Development. Seabed lowering/feature clearance parameters shown below will depend on local water depths at time of installation and seabed conditions, therefore anticipated parameters are presented in Table 4.18 and Table 4.19.

Table 4.18: Anticipated seabed lowering clearance limits for WTG and OSP installation

	56 WTG Option and 2 OSP	47 WTG Option and 2 OSP
Number of structures	58	49

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	56 WTG Option and 2 OSP	47 WTG Option and 2 OSP
Total footprint of seabed clearance for scour protection (m^2)	215,540	180,900
Total volume of seabed clearance for scour protection (m^3)	1,000,000	1,000,000
Total footprint of seabed clearance for WTG/OSP installation (m^2)	13,920	11,760
Total volume of seabed clearance for WTG/OSP installation (m^3)	139,200	117,600

Table 4.19: Anticipated seabed lowering / features clearance limits for cable installation

	Offshore Export Cables	Inter-Array Cables	Interconnector Cable
Seabed clearance width (m)	70	70	70
Percentage of cable length requiring seabed clearance (%)	30	30	30
Total footprint of seabed clearance (m^2)	840,000	2,562,000	588,000
Total volume of seabed clearance (m^3)	500,000	1,000,000	500,000

4.3.2.11 Seabed lowering/features clearance will involve removal of material from seabed features (such as sandwaves or megaripples) by techniques such as dredging, mass flow excavation, water injection dredging or utilisation of pre lay route clearance ploughs. Any material recovered as part of these operations will be deposited in locations within the Array Area. This activity is carried out for a number of reasons including:

- To ensure the cable burial tool can safely move along the cable route post cable lay, without encountering excessive slopes or disturbances that would impede operation of the tool.
- Seabed lowering/features clearance may need to be carried out to ensure the cable can be buried to target depth to ensure sufficient protection.
- To ensure that the seabed is sufficiently clear and level for jack-up vessels to jack-up.
- To ensure the area within which scour protection is to be installed is sufficiently level.
- To ensure the level of potential future seabed lowering from installation seabed level to potential lowest seabed level is within the bounds accommodated for by the scour protection design.

4.3.2.12 A specialist dredging vessel will be required to complete the seabed lowering/features clearance during the seabed preparation phase. The dredging vessel, using a suction hopper or similar, will dredge as required, recovering material to the vessel, and the material will be redeposited within the Array Area. If the movement of material and associated relocation requires a Dumping at Sea permit, then the Developer will secure this license from the Environmental Protection Agency (EPA). An overview of the techniques used for seabed lowering/features clearance are summarised in Table 4.20.

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Table 4.20: Overview of the techniques used for seabed lowering/features clearance

Seabed Lowering/Features Clearance Technique		Description
1	Backhoe Dredging / Grab or Clamshell Dredging	Lowering of seabed via use of backhoe excavators or clamshell grab equipment deployed from shallow draft barge or vessel.
2	Mass Flow Excavation / Water Injection Dredging	Fluidisation / suspension of sediments by pumping water into the seabed via fixed or suspended equipment deployed from multicat, SOV or dedicated dredging vessel.
3	Suction Hopper	Seabed lowering by means of typical dredging equipment such as trailing suction hopper dredgers.
4	Pre-lay Plough	Seabed features can be smoothed by pulling clearance pre-lay ploughs along the route prior to cable installation.

PRE-LAY GRAPNEL RUN (PLGR)

4.3.2.13 A PLGR is conducted on cable routes prior to installation activities. This process includes trailing several linked grapnels to clear the cable installation route of debris.

Step 3 – Foundation installation and scour protection installation

MONOPILE FOUNDATIONS

4.3.2.14 WTG and OSP foundations will be transported to the Array Area by vessel from the fabrication site or marshalling port facility.

4.3.2.15 Monopiles will be installed into the seabed by either piling or drilling techniques, or a combination of both (drive-drill-drive), depending on seabed conditions.

4.3.2.16 Piling the monopiles using a hydraulic impact hammer is the basecase method for monopile installation. Hydraulic impact hammering may in some instances be fully replaced or complimented by use of a vibro-hammer. In the complimentary use case, the vibrohammer would be used to install the monopile in the upper less competent soil layers. After monopile refusal (monopile ceases to penetrate further into the seabed) the vibrohammer would be replaced with an impact hammer in order to advance the pile to target embedment depth. As the name suggests a vibro-hammer imparts vibration on the pile and immediate surrounding soil. This vibration locally decreases soil resistance thereby allowing the monopile to penetrate through the soil. Vibrohammers are only effective in suitable soil conditions and have limited effect in high strength soils.

4.3.2.17 Impact hammer piling characteristics for monopiles are presented in Table 4.21. When piling a monopile using a hydraulic impact hammer, the monopile is lowered to seabed level using a crane and kept in position using a pile gripper. The hydraulic impact hammer is then positioned onto the monopile and the monopile is driven to target depth. Although a hammer energy of 6,600 kJ is considered as the maximum for the purposes of assessment, the actual energy used when piling will be significantly lower for the majority of the time and locations. The hammer energy is only raised to that maximum value when/if absolutely necessary (i.e. toeing into rock). In all cases piling will commence with a lower prescribed soft-start hammer energy during a 30 minute soft

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start. This is followed by a period, of up to 147 minutes, where the hammer energy applied is that required for optimum pile advancement to target depth.

Table 4.21: Anticipated monopile piling characteristics

Parameter	56 WTG Option	47 WTG Option	OSPs
Number of Structures	56	47	2
Number of piles requiring piling	56	47	2
Maximum hammer energy (kJ)	4,000 (north & centre of Array Area) 6,600 (south of Array Area)	4,000 (north & centre of Array Area) 6,600 (south of Array Area)	4,000 (north of Array Area) 6,600 (south of Array Area)
Max Soft start energy (kJ)	825	825	825
Soft start duration (minutes)	30	30	30
Maximum strike rate (strikes per minute) – soft start	0.6 bl/min for 10 minutes followed by 30 bl/min for 20 minutes at the same hammer energy	0.6 bl/min for 10 minutes followed by 30 bl/min for 20 minutes at the same hammer energy	0.6 bl/min for 10 minutes followed by 30 bl/min for 20 minutes at the same hammer energy
Number of piles impact hammered over 24 hours	1	1	1
Maximum duration of piling per day over construction period (hours)	5hrs 10mins	5hrs 10mins	5hrs 10mins
*Total number of days when piling may occur over construction period	75	63	4

** Total number of days when piling may occur is greater than the number of structures, due to the possibility of pile refusal, weather delay or equipment and vessel malfunction. This may require piling to be carried out at a single location over multiple days.*

4.3.2.18 Where very challenging ground conditions are encountered, such as shallow competent bedrock occurring shallower than target monopile embedment depth, drilling techniques may need to be used.

4.3.2.19 Drilling characteristics for monopiles of Drilling, Drive-Drill-Drive (DDD) or drilled and grouted will result in the release of seabed material, which will be deposited adjacent to each drilled foundation location. Characteristics associated with the foundations requiring drilling are presented in Table 4.22. If drilling is required (i.e. in the event that piling may not be suitable due to hard ground) then a DDD methodology is preferred, although other methodologies (i.e. drilled and grouted) may be considered if more optimal and is described below. For locations where ground conditions are marginal for MP installation to target depth by driving, the DDD method

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can be used as contingency. For locations where ground conditions dictate drilling will be required the selection of the drilled and grouted technique over DDD would be dictated by a complex assessment of the strength and integrity of rock being drilled into, the depth below seabed at which rock will be encountered, and the depth of rock which needs to be drilled into.

4.3.2.20 DDD involves driving the monopile until it hits first refusal (i.e. rate of monopile advancement is below pre-determined threshold). If refusal has occurred above the required installation depth a decision is taken to deploy an under-reaming drill, which would be lowered down through the monopile. The drill would initially drill out the soil plug within the monopile. The drill continues to drill beyond monopile toe depth scrabbling away the underlying rocks / dense material layer(s) which are causing excessive resistance to pile driving. When the drill has reached the predetermined target depth it is recovered through the monopile. The impact hammer is redeployed on top of the monopile and driving resumes until the monopile is driven to target penetration depth. This DDD cycle may occur more than once as required.

4.3.2.21 The drilled and grouted technique requires a large caisson to be pre-installed above the rock layer in order to hold back superficial deposits. The drill drills through the caisson and into the underlying rock to target depth forming a rock socket under the caisson. The drill is then recovered, and the MP is installed into the socket formed by the caisson and drilled out rock. The annulus between the MP and caisson/rock is filled with structural grout to allow load transfer from the monopile into the surrounding soil. Allowance has been made for grout wastage in case of any fissures within the rock, which are not anticipated in the initial net grout volume calculation.

4.3.2.22 Drilling, DDD or drilled and grouted will result in the release of seabed material, which will be deposited adjacent to each drilled foundation location. Characteristics associated with the foundations requiring drilling are presented in Table 4.22.

Table 4.22: Anticipated monopile drilling characteristics

	56 WTG Option	47 WTG Option	OSPs
Number of Structures	56	47	2
Number of piles requiring drilling	25	25	2
Drilling rate	0.2m/hr - 0.4m/hr (in rock), 0.6m/hr - 1.0 m/hr (in sand) and 0.2m/hr - 0.6m/hr (in clay)		
Drilling depth (m)	37	37	45
Volume of drill arisings per pile (m^3)	5,280	7,040	13,860
Total volume of drill arisings for component type (m^3)	132,000	176,000	27,720

GROUT

4.3.2.23 Grout characteristics and volumes which will be used for the Proposed Development are presented in Table 4.23.

Table 4.23: Grout characteristics for monopile foundations

Grout characteristics	56 WTG Option	47 WTG Option	OSPs
Total Proposed Development Grout volumes (m^3)	90,720	76,140	5,140

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4.3.2.24 A TP may be installed over the monopile foundation and secured via inert grout or bolts. Where a TP is used, the secondary steel will be pre-installed onto the TP at the fabrication site or port facility. Alternatively, the monopile may be connected directly to the turbine tower using a bolted connection (TP-Less solution). If a TP-Less solution is progressed the secondary steel will likely be installed offshore, either as a single caged solution or as individual secondary steel components. Secondary steel means steel that does not form the primary load path in an offshore structure and includes platforms, handrails, ladders, boat landings, j-tubes, equipment attachment points and associated appurtenances. For the OSPs a j-tube cage will be installed over the monopile prior to the installation of the TP. A second installation vessel may be used for this offshore secondary steel installation.

4.3.2.25 Grout can be used in the MP-TP connection, or OSP TP to OSP Topsides connection, either as a structural or sealing component

SCOUR PROTECTION

4.3.2.26 Where scour protection is required, this will be achieved using one or more of the solutions previously described. Should loose rock be used, this will be installed using a rock installation vessel equipped with a fall pipe for rock placement. The other solutions described in section 4.2.5 would be installed on the seabed using the crane of an installation vessel.

Step 4 – OSP topside installation/commissioning

4.3.2.27 The OSP topsides will be transported to the Array Area by vessel either from the fabrication yard or the pre-assembly harbour. The OSP will be transported by the installation vessel or on a barge towed by a tug. Once on site, the lift rigging for the OSP will be installed, and the seafastening removed before being lifted and installed onto the foundation. The OSP topside will then be welded, grouted or bolted to the foundation. Once the structural joint is completed, the corrosion protection system will be re-instated to protect the joint. The installation vessel will mobilise with all the required equipment including rigging, welding, bolting equipment and corrosion protection system repair equipment.

4.3.2.28 All necessary cable connecting and commissioning works are expected to be carried out with the assistance of a jack-up, commissioning service operation vessel or similar vessel, with assisting support and supply vessels as required. Due to the proximity to shore it is likely that Crew Transfer Vessels (CTVs) will be used to transfer personnel to and from the installation vessel or similar vessel. When the final commissioning and testing works along with any outstanding snagging items have been completed and operated for a period of c.18 months, the OSP will then be handed over to EirGrid. From this point EirGrid will be responsible for the operations and maintenance of the vast majority of the OSP.

Step 5 – Offshore export cable – landfall installation

4.3.2.29 At the landfall, the offshore export cables will be connected to the consented ABWP2 Onshore Grid Infrastructure (OGI) landward of the HWM. The Proposed Development extends to the HWM point however as the trenchless methodologies for transiting the cables from sea to land is a single operation and includes land based works (subject to a separate consent) a full description is provided for context. Consent is only being sought for works associated with the Proposed Development seaward of the HWM. Trenchless technology involves drilling an underground pathway from one point to another, through which the offshore export cable is installed, without the need to excavate an open trench. A working area will be established (onshore) containing the drill rig, electrical generator, water tank, mud recycling unit and temporary site offices.

4.3.2.30 Two trenchless installation methods have been assessed and a preferred method will be selected based on a number of considerations including ground conditions, topography, cable design parameters, met ocean conditions and cable installation method. The following sections describe

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the methods for horizontal directional drilling (HDD) and steerable direct pipe thrusting ("Direct Pipe").

4.3.2.31 With regards to HDD methodology, the drilling equipment will be located inland of the landfall with installation commencing from above the HWM and with the HDD exit point located seaward of the intertidal zone. As such, no works are planned to take place in the intertidal zone. Drilling fluid comprising a mixture of bentonite and water is pumped to the drilling head during the drilling process to stabilise the hole and retrieve the drilled material. During the drilling process some drilled material will be deposited at the HDD exit point. Once the drilling is complete, cable ducts will be installed either from land and pushed out using specialised pipe pushing equipment, or towed into position by a vessel offshore and pulled in through the bore using land based winches. A supporting marine spread including vessels and divers may be required to assist with the drilling and installation of the ducts. The offshore export cables will be installed from a vessel offshore and pulled through the pre-installed ducts by land-based winches.

4.3.2.32 The HDD reception pits will be located in a suitable water depth to facilitate both drilling operations and cable installation / protection operations.

4.3.2.33 The HDD works comprise the following main stages:

1 A pilot hole will be drilled from onshore to offshore, without breaking out on the seabed;

2 Once the pilot hole has been completed, the reaming process will commence, increasing the diameter of the pilot hole to accommodate the safe installation of HDD duct. The reaming process will continue back and forth for a number of passes to achieve a bore diameter suitable for the installation of the duct. The bore will be larger than the duct diameter to allow the duct to pass through the bore. During the drilling procedure, drilling fluid is continuously pumped to the drill head to act as a lubricant. Solids will be settled out from the returning drilling mud/cuttings, and the spoil is transported off site;

3 A jack-up vessel or dredger or offshore support vessel will be used at the HDD exit point;

4 An exit pit will be created at the HDD exit point. This will be achieved using a combination of dredging, air lift and long reach excavators;

5 The last forward HDD reamer exits the seabed at the exit pit. Upon completion of the bore reaming, the drilling head will punch through the seabed where it will be recovered. At this point in the process, drilling fluid will be released into the water column as a function of the head of fluid above the water level;

6 The HDD reamer will then be disconnected from the drill pipe and recovered;

7 A High-Density Polyethylene (HDPE) liner pipe will be pre-assembled and then floated in, connected to the drill pipe, and pulled onshore from the offshore end through the pre-drilled bore into position. Alternatively, the duct may be assembled near the onshore HDD entry point and installed by means of specialised pipe pushing equipment;

4.3.2.34 Steps 1 to 7 are will then be repeated for the second cable circuit;

8 Trenches will then be excavated from the HDD entry points above the HWM to the transition joint bay and ducts installed and backfilled;

9 HDD construction equipment and plant will then be demobilised from site;

10 The ducts are then proved ready for cable installation with installation of pull-in wires;

11 Cables will then be installed in the ducts by pulling onshore through the ducts from the offshore delivery vessel to the transition joint bays;

12 Once cables are installed, the HDD offshore exit pits may be backfilled or stabilised with soil, rock, filter bags or mattresses as required.

Scoping

4.3.2.35 As noted above the Proposed Development extends to the HWM point however as the trenchless methodologies for transiting the cables from sea to land is a single operation and includes land based works (subject to a separate consent). A full description is provided for context. Consent is only being sought for works associated with the Proposed Development seaward of the HWM. For direct steerable pipe thrusting, the drilling installation will commence from above the HWM, with the exit point seaward of the intertidal zone. As such, no works are planned to take place in the intertidal zone. Due to the required size of machinery, the bore diameter as a result of this method is larger than that produced by HDD.

4.3.2.36 Temporary earthworks are required onshore to align the pipe thruster machine to the initial path of the drill trajectory. An exit pit is required subsea to allow recovery of the micro tunnel bore machine (MTBM). This will be supported by offshore support vessels, assisted by remotely operated vehicle (ROV) and/or divers. The exit pit will require preparation via dredging, use of excavators or air lifting. An exit pit is required subsea to allow recovery of the MTBM. This will be supported by offshore support vessels, assisted by remotely operated vehicle (ROV) and/or divers. The exit pit will require preparation via dredging, use of excavators or air lifting.

4.3.2.37 The Direct Pipe works comprise the following main stages

1 A shallow entry pit will be excavated above the HWM to facilitate the required conduit entry angle and provide anchorage to the pipe thruster typically comprising sheet piles and bracing.

2 The pipe thruster will then push a MTBM into the ground using lengths of steel casing/conduit. An internal belt system will return drilling mud / cuttings to the surface which will then be transported offsite for disposal;

3 Marine support vessels such as a Jack Up Vessel (JUV), anchor barge or other will be required at the MTBM exit point in order to prepare the exit pit and assist with recovery of the MTBM.

4 The Direct Pipe drive will be completed by MTBM punching out into exit pit.

5 The MTBM will then be disconnected from the pipe with diver or ROV assistance and recovered.

6 The direct pipe conduit will be capped in preparation for cable installation.

4.3.2.38 Steps 1 to 6 will then be repeated for the second cable circuit;

7 Pipe thrusting construction equipment and plant will then be demobilised from the onshore site.

8 The conduits are then proved ready for cable installation and pull-in wires installed.

9 Cables will then be installed by pulling the cable through the conduits from the cable installation vessel by means of an onshore winch.

10 Trenches will be excavated from the conduits entry points above the HWM to the Transition Joint Bay (TJB).

11 Remaining length of cable will be installed from the conduit to the TJB and trenches backfilled.

12 Once cables are installed the offshore exit pits will be backfilled or stabilised with soil, rock, filter bags or mattresses as required

4.3.2.39 Once commenced, the trenchless drilling activities will be required to operate continuously (24 hours / day) until each bore is complete. This 24-hour operation is to reduce the risk of drilling complications arising, including bore collapse and the drilling head becoming stuck. Subject to further construction planning and availability of drilling rigs, drilling may be carried out simultaneously (for both circuits).

4.3.2.40 Offshore export cable landfall installation parameters are presented in Table 4.24. The reception pits will have anticipated dimensions of 75 m (length) and 5 m (width) resulting in a volume of material excavated from each exit pit of 937.5 m^3.

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Table 4.24: Offshore export cable - landfall parameters

Parameter	Value
No of cable circuits	2
Length of each bore hole from HWM to exit pit	350 – 880m
Voltage	220 kV
Transmission system	HVAC
Burial depth (between HWM and reception pits) (m)	0-17

4.3.2.41 Drilling Fluid usually comprise 95% water and 5% bentonite clay which is a non-toxic, natural substance. Biodegradable bentonite drilling fluid is non-toxic and can be commonly used in farming practices. Every endeavour will be made to avoid a breakout (loss of drilling fluid to the surface). The procedure for managing a breakout under water will include:

- Stop drilling immediately;
- Pump lost circulation material (mica), which will swell and plug any fissures;
- Check and monitor mud volumes and pressures as the works recommence; and
- Repeat process as necessary until the breakout has been sealed.

Step 6 – Offshore export cable – offshore installation and cable protection installation

OFFSHORE EXPORT CABLE INSTALLATION

4.3.2.42 There are two pull in techniques considered for the cable installation through the landfall transition. The first being direct pull in, where the cable vessel will sit a short stand-off distance from the landfall transition exit point where the cable is pulled directly and unreeled from the vessel. The second being a floated pull in, where the vessel will stand-off at a suitable water depth for its safe operation and float the cable toward the duct, with a second vessel or jack up barge assisting located above the landfall transition exit point to guide the cable through the duct. The preferred pull-in method will depend on the final location of the landfall transition exit point, site conditions and characteristics of the marine installation spread with higher draft vessels required to be positioned in deeper waters.

4.3.2.43 For the direct pull in method, a shallow draft vessel with DP or anchor spread will be used. These vessels can operate in shallow waters in the nearshore area. For the direct pull in method an additional support vessel may be required to prepare the landfall transition duct and exit point for the cable pull in. These activities will include removal of temporary stabilisation such as rock bags, removal of duct end caps and installation of pull-in accessories such as bellmouths. Once the preparations are complete, the cable installation vessel will position near the duct exit location and deploy the cable overboard via a chute and tensioners with the cable pulled through the landfall transition duct by means of an onshore pull-in winch.

4.3.2.44 For the floated pull in method, a larger draft vessel will be used which would position a few hundred metres away from the landfall transition exit point. At the landfall transition exit point a 'spud pontoon'/small jack up or an anchored multicat vessel will be positioned. The larger draft vessel will then deploy the offshore export cables with suitable flotation devices, such as pillow floats, which support the cable in the water and keep it buoyant. The floated cable will be guided toward the pontoon via a small vessel where it will then be connected to a pull rope through the landfall transition on the pontoon. The purpose of the pontoon is to act as a working platform to remove the flotation devices, take load of the cable through tensioners, guide the cable over a chute, which will then guide the cable down to the seabed into the landfall transition duct.

4.3.2.45 Following pull in and anchoring of the offshore export cables within the landfall compound onshore, the cable will be laid along a predefined route between the offshore exit pit and OSP.

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The cable will be over boarded from the stern of the cable lay vessel (CLV), either free laid on the seabed surface or simultaneously laid and buried via a plough as described in the cable plough methodology below. Free laid cable will require protection from incident until buried. This will be managed by guard vessels, the total number will be defined by the anticipated risk associated with the routes in the interim period (i.e. following being laid and before burial).

4.3.2.46 There are various types of installation tools that may be used to bury the offshore export cables. It is expected that the majority of the cable route will be buried with the use of jet trenching or jet ploughing tools, however use of mechanical cutting tools or pre-cut trenching equipment may be required depending on soil conditions. For areas with significant mobile sediments, a vertical injector system is proposed to be deployed in order to achieve the required burial depth below Lowest Seabed Level. The typical installation tools/methodologies are jet trenching, cable plough, mechanical trenching, pre-lay plough, vertical injector and controlled flow excavation.

4.3.2.47 The following techniques are proposed for cable burial;

- The jet trenching methodology uses a jetting tool that injects water at high pressure into the sediment surrounding the cable to temporarily fluidise it allowing the cable to sink to the required burial depth;
- The cable plough methodology uses a towed plough to open a narrow trench in the seabed into which the cable is inserted simultaneously. Typically, the cable plough shear is fitted with a jet system. This reduces the high tow force generally exhibited in sands during ploughing;
- The mechanical trenching tools use mechanical means to excavate a trench in the seabed. Numerous cutting boom and chain/pick configurations with varying levels of power are available. The mechanical cutting tools are generally fitted with a depressor which guides the cable through the fluidised materials in the excavated trench;
- The pre-lay plough methodology is similar to the cable plough method described above however the pre-lay option uses a larger plough, which creates a “V” shaped trench prior to cable lay operations. The trench is created to the required depth, with the cable laid into the trench, normally by another vessel; followed by a second pass of the plough to return sediment over the cable and trench;
- The vertical injector tool uses pressurised water to trench through soils and the cable is fed through the tool. Therefore, it is a simultaneous trenching and laying tool. The tool is either vessel mounted or mounted on skids; and
- The controlled flow excavation method is where a low-pressure, high-volume flow of water is concentrated around the cable, fluidising the seabed and allowing the cable to drop through sediments to the required depth. A number of passes may be required to achieve the burial depth.

Cable Protection Installation

4.3.2.48 Cable protection will be used where sufficient burial depth within the seabed is not achieved during installation, due to difficult ground conditions being encountered, and at cable crossings. Cable protection is also used as cables approach and enter the WTGs and OSPs.

4.3.2.49 The installation of cable protection typically consists of:

- For **CPS,** the product (i.e. ducts) is assembled around the cable on the vessel during the cable laying campaign. The cable enclosed in the CPS is then lowered into the water and installed. Alternatively, the CPS is pre-installed on the WTG or OSP foundation and the cable is then pulled through the CPS during installation;
- **Concrete mattresses** are constructed using high strength concrete blocks and U.V. stabilised polypropylene rope. They are usually supplied in standard 6 x 3 x 0.3 m units of standard density. The mattresses are installed above the cables with a standard multicat type DP vessel and free-swimming installation frame. The mattresses are lowered to the seabed and once the

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correct position is confirmed, a frame release mechanism is triggered and the mattress is deployed on the seabed;

- **Rock installation** is achieved using a vessel with equipment such as a 'fall pipe' which allows installation of rock close to the seabed. The rock installation is designed to provide protection from anchor strike and anchor dragging, and to allow over trawl by fishing vessels. Alternatively, pre-filled rock bags can be placed above the cables with specialist installation beams.

4.3.2.50 On approach to WTGs and OSPs, the cable will exit the seabed within CPS, and run for a short distance before entering the J-tube attached to the WTG or OSP foundation. The CPS at both the OSP and WTG substructure will be stabilised with rock or rock bags or mattresses to the point of full burial of the cable within the seabed.

CABLE CROSSING INSTALLATION

4.3.2.51 As noted in paragraph 4.2.5.15, cable crossings will be required where cables associated with the Proposed Development cross each other and/or the existing ABWP1 export cable. The crossings will be completed using one of the protection technologies as described in paragraph 4.3.2.48. In all instances, a crossing angle close to 90 degrees relative to the existing cable, will be considered.

4.3.2.52 A separation layer between seabed and the crossing cable is required ahead of cable laying. A separation of 500 mm is required and can be created either through a rock berm or concrete mattress installation.

4.3.2.53 Upon completion of the cable lay on top of the separation layer, a vessel will return to place the post lay mattresses on top of the newly installed offshore export cables, these will cover the full transition of the cable from buried depth to surface.

4.3.2.54 Completing the crossing using rock placement, the offshore export cables are then installed over the separation layer and post installation the rock placement vessel returns to install the berm from the transition points over the crossing.

Step 7 – Inter-array and interconnector cable installation and cable protection installation

4.3.2.55 The installation techniques as described in step 6 for export cable installation will also be employed for inter array and interconnector cable installation and where burial by mechanical methods is not achieved, cable protection will be used.

4.3.2.56 Cables will be pulled into OSP and WTG substructures through the associated J-tubes or aperture. The cable will be installed from a cable lay vessel, supported on OSP/WTG by teams managed from either an offshore support vessel or CTV. Cables will be free laid on the surface and either simultaneously buried using a burial tool deployed from the installation vessel or buried post-lay with a burial tool deployed from an independent vessel spread.

4.3.2.57 Cable protection installation will apply as described in paragraphs 4.3.2.47-4.3.2.49.

CABLE CROSSING INSTALLATION

4.3.2.58 As noted in paragraph 4.3.2.51, cable crossings will be required where the cables associated with the Proposed Development cross each other and/or the existing ABWP1 export cable. The crossings will be completed using one of the protection technologies as described in paragraph 4.3.2.48.

4.3.2.59 A separation layer between seabed and the crossing cable is required ahead of cable laying. A separation of 500 mm is required and will be created either through a rock berm or concrete mattress installation.

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4.3.2.60 Upon completion of the cable lay on top of the separation layer, a vessel will return to place the post lay mattresses on top of the newly installed offshore export cables, these will cover the full transition of the cable from buried depth to surface.

4.3.2.61 Completing the crossing using rock placement, the offshore export cables are then installed over the separation layer and post installation the rock placement vessel returns to install the berm from the transition points over the crossing.

Step 8 – WTG installation and commissioning

4.3.2.62 The WTGs will be transported to the Array Area by vessel from the pre-assembly port where sub-assemblies (nacelle, rotor blades and towers), assembly parts, tools and equipment will be loaded onto a transport/installation vessel or support vessel. The number of WTGs transported per trip and thus exact number of trips in total will depend on the vessel selected.

4.3.2.63 At the Array Area, the WTG tower will be installed onto the foundations, followed by the nacelle and blades. Due to the height of the WTGs, this will involve the use of a crane based onboard the installation vessel. The blades will be installed one at a time or alternatively, the hub including all three blades will be installed as a pre-assembled rotor. Pressure washing may take place during WTG installation to remove any marine growth or guano that may have accumulated following installation of the foundations.

4.3.2.64 Following installation of the WTG, mechanical and electrical completion work will take place including connecting the WTG to the inter-array cabling, then a process of testing and commissioning will commence, and the energisation will be undertaken. Prior to energisation of the WTG, temporary power generation will be provided, either from a vessel, photovoltaic (PV) panels or a temporary generator, to supply power to ancillary systems (e.g. lighting, navigation aids and dehumidification, etc.)

4.3.2.65 Following energisation, the WTGs will start operating and producing/consuming power and the final works including further testing and inspections will take place. WTGs may consume power for ancillary systems in conditions when the WTG is not producing power. Some minor outstanding works may also require re-visits to the WTG during this period. In some cases where larger damage/defects during the installation/commissioning have occurred, it may be required that the installation or support vessel revisits the WTG(s), transporting the replacement component(s), tools and equipment required for the repair from port.

4.3.3 Construction ports

4.3.3.1 It is likely that the Proposed Development components will be fabricated at a number of manufacturing sites across Europe or elsewhere. Components may be transported directly to the Proposed Development from where they are manufactured, or may be delivered to a port where they are stored in line with the day to day practice of that port, before onward transport to the Array Area. This will be determined as part of competitive tendering processes.

4.3.3.2 All large components for the Proposed Development will be transported via sea transport to the Array Area and/or Cable Corridor and Working Area for installation via vessels and associated equipment. Therefore there is no requirement for large components (e.g. WTG blades, foundations etc) to be transported via road in the vicinity of Arklow.

4.3.3.3 The construction port for the storage, fabrication, pre-assembly and delivery of Proposed Development infrastructure has not yet been confirmed at the time of writing this EIAR. Suitable ports which have appropriate facilities to handle and process OWF components will be selected. All activities carried out within port will fall under established port licences and operational controls.

4.3.3.4 Construction personnel will transit from shore to the location of the Proposed Development on the installation vessels or other vessels and / or helicopters listed in Table 4.12 to Table 4.14.

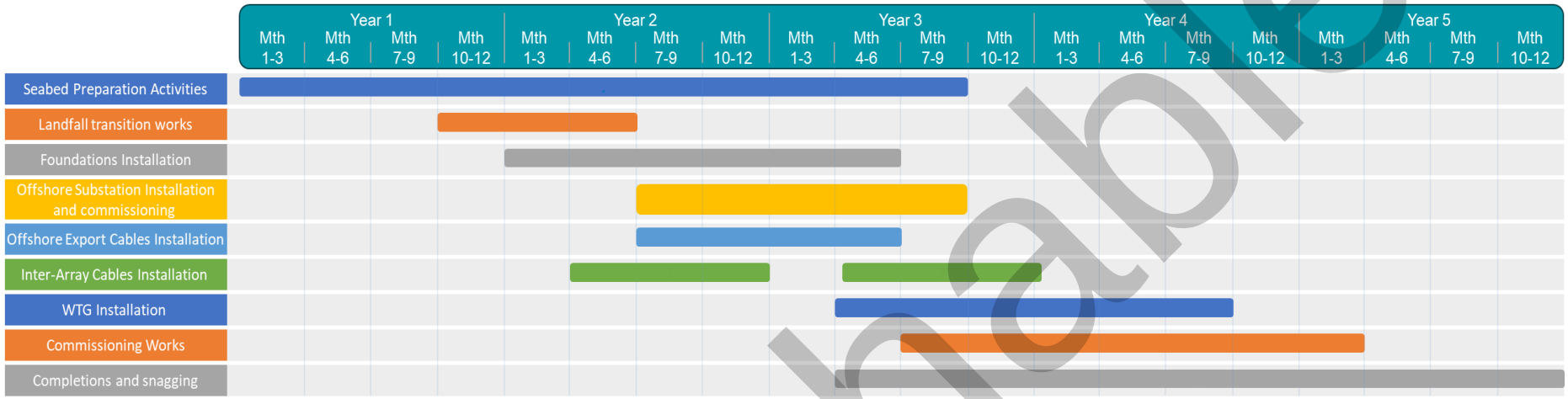
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4.3.4 Construction Programme

4.3.4.1 A high-level construction programme is provided in Table 4.25. and a construction period of five years has been assumed and assessed. The programme illustrates the likely duration of the installation activities associated with each of the major components, and how they may progress in relation to each other.

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Table 4.25: High level construction programme



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4.3.4.2 The timing of commencement of the construction programme for the Proposed Development will depend on a number of factors, including:

- Secure a route to market in accordance with the requirements within the Proposed Development's Maritime Area Consent (2022-MAC-002).
- Successful grid connection application to EirGrid and subsequent programme for connection;
- The availability and lead times associated with procuring and installing the Proposed Development components; and
- Securing planning consent for the Proposed Development.

4.4 Operation and maintenance

4.4.1 Health and Safety

4.4.1.1 All project personnel and contractors will be required to be fully compliant with their responsibilities as defined by:

- The Safety, Health and Welfare at Work Act 2005;
- The Safety, Health and Welfare at Work (General Application) Regulations 2007 (as amended);
- The Safety, Health and Welfare at Work (Construction) Regulations 2013 (as amended);
- The Safety, Health and Welfare at Work (Diving) Regulations 2018 (as amended);
- The Safety, Health and Welfare at Work (Reporting of Accidents and Dangerous Occurrences) Regulations 2016 (S.I. No. 370 of 2016);
- The Chemicals Act 2008 and The Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001 (S.I. No. 619/2001) as amended;
- The Merchant Shipping Act 1894 & The Merchant Shipping (Investigation of Marine Casualties) Act, 2000
- The HSA ACoPS
- Wind Energy Ireland ACoPS
- G+ Offshore Wind Health & Safety Association guidance documents
- Code of practice for safe use of cranes BS 7121-1:2016
- Other applicable industry standards/best practice such as ISO, DNV, etc

4.4.2 Operational lifetime

4.4.2.1 The operational life of the Proposed Development will be limited by the 45 year term as currently outlined in the MAC which commenced in December 2022. This means that decommissioning / rehabilitation activities of the Proposed Development will be completed by December 2067. For the purposes of assessment an operational period of up to 36.5 years is assumed.

4.4.2.2 EirGrid will take over ownership and related operational and maintenance activities of the transmission assets i.e. the OSPs, offshore export cables including the interconnector cable approximately 18 months post energisation of the onshore grid infrastructure.

4.4.3 Security and control systems

4.4.3.1 During the operational lifetime of the Proposed Development, regular inspection and maintenance activities will be required, coordinated by a team based at the ABWP2 Operations and Maintenance Facility (OMF) at Arklow Harbour. In June 2022, the Developer received planning permission from Wicklow County Council (Planning Register Reference: 21/1316) to develop the ABWP2 OMF at South Dock, Arklow Harbour. The building and associated pontoon and ancillary infrastructure as shown in Figure 4.30 will serve as the support base for ABWP2 throughout its

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operational lifetime and will support around 60-80 long term local jobs. Potential in combination effects arising from the ABWP2 OMF and the Proposed Development are considered within the Natura Impact Statement.

4.4.4 Methodology

4.4.4.1 Generally, inspection and day-to-day maintenance will be carried out by a team/team of technicians transiting to and from the Array Area in the CTVs which will be based at the OMF. Other maintenance vessels, such as Service Operation Vessels (SOVs), may also be used to support maintenance activities. Occasionally, in the event of a fault or in order to maintain larger components, maintenance will be carried out by larger vessels, such as jack-up vessels. Any major component replacement activities will be undertaken by larger vessels operating from suitable port facilities; the OMF will not be used for storage or transport of major components such as blades. Inspection and maintenance activities will ensure that the Proposed Development is closely monitored and maintained in good working order.

4.4.4.2 Table 4.26 to Table 4.29 provide a description of the reasonably foreseeable maintenance activities anticipated to be required over the lifetime of the Proposed Development associated with the WTGs and OSPs, and their foundations.

4.4.4.3 Table 4.30 to Table 4.32 provide a description of the reasonably foreseeable maintenance activities associated with the inter-array, interconnector and offshore export cables anticipated to be required over the lifetime of the Proposed Development. It should be noted that cable failure is considered to be a rare occurrence.

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Table 4.26: Operational and maintenance activities - WTG foundations

Activity	Description	Methodology	Frequency
Routine Inspections	Inspections of foundations, including TPs and ancillary structures (e.g. J-tubes), above and below sea level	Small team access by CTV	Every six months for first two years and annually thereafter
Geophysical surveys	Survey of seabed and assets	Survey vessel(s) or Unmanned Surface Vehicles (USV)	Every six months for first two years and annually thereafter
Repairs and replacements of navigational equipment	Repairs and replacements of electrical equipment such as lighting, fog horns, navigation lights and transponders	Small team access by CTV	Once every two years
Removal of marine growth	Removal of marine growth from foundations, TPs and access ladders	Pressure washer from CTV	Annual removal of area above water and two subsea removals across operational life of Proposed Development.
Removal of guano	Removal of guano from foundations, TPs and access ladders	Pressure washer from CTV	One to two times per year
Replacement of corrosion protection anodes	Remove and replace anodes required for corrosion protection	Divers or ROV usually deployed from a DP vessel	Four per year across windfarm
Painting	Application of paint or other coatings to protect the foundations from corrosion (internal/external), including surface preparation	Small Team access by CTV	25% of assets annually
Replacement or modifications of ancillary structures (if required)	Removal and replacement of ancillary structures such as Davit Cranes	Small Team access by CTV	all assets every 5 years
Scour protection repair and maintenance	Including remedial works, replacement of scour protection and removal of excess seabed sediment, where required.	See section 4.2.5, Step 3 – Foundation installation and scour protection installation. Specialist dredging vessel.	All assets every 5 years
Modifications to/replacement of J-tubes	Modifications to/ replacement of J-tubes e.g. during inter-array cable repair works.	Divers or ROV usually deployed from a DP2 vessel	1 every 5 years

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Table 4.27: Operational and maintenance activities - OSP foundations

Activity	Description	Methodology	Frequency
Routine Inspections	Inspections of foundations, including platforms and ancillary structures (e.g. J-tubes), above and below sea level	Small team access by CTV	Every six months for first two years and annually thereafter
Geophysical surveys	Survey of seabed and assets	Survey vessel(s) or Unmanned Surface Vehicles (USV)	Every six months for first two years and annually thereafter
Removal of marine growth	Removal of marine growth from foundations or access ladders.	Ad hoc pressure washer from CTV/SOV	Removal occurring on every OSP twice over the lifecycle of the project
Removal of guano	Removal of guano from foundations, transition pieces, or access ladders.	Pressure washer from CTV	One to two times per year
Replacement of corrosion protection anodes	Remove and replace anodes required for corrosion protection.	Divers or ROV usually deployed from DP vessel	Sacrificial anode system: 1 complete system replacement in the design life of the OSP Impressed Current Cathodic Protection System: 1 system repair every 5 years
Painting	Application of paint or other coatings to protect the foundations from corrosion (internal/external), including surface preparation.	Small team access by CTV/SOV	Touch up painting carried out annually
Replacement of ancillary structures	Removal and replacement of ancillary structures such as Davit cranes.	Small team access by CTV/SOV	All assets every 5 years

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Scour protection repair and maintenance	Including remedial works, replacement of scour protection and removal of excess seabed sediment, where required.	See section 4.3.2, Step 3 – Foundation installation and scour protection installation. Specialist dredging vessel.	All assets every 5 years
Modifications to/replacement of J-tubes, boat landings and access ladders	Modifications to/ replacement of J-tubes, boat landings and access ladders e.g. during inter-array or export cable repair works.	Small Jack-up vessel, divers or ROV usually deployed from a DP2 vessel	1 every 5 years

Table 4.28: Operational and maintenance activities – WTGs

Activity	Description	Methodology	Frequency
Routine inspections	Internal and external inspections of the WTGs	Small team access by CTV	Rolling campaign, Percentage of site / year based on site size. Undertaken from site-based CTV's
Replacement of consumables	Replacement of consumables within the WTG (e.g. filters, oils, lubricants)	Small team access by CTV	Oils/filters annually. Gearbox oil minimum 5 yearly
Removal of marine growth/guano	Removal of marine growth and guano from access platforms	Pressure washer	one to two times per year
Minor repairs and replacements within the WTG	Minor repairs and replacements within the WTG (e.g. motors, pumps, small electric equipment, circuit breakers, fuses)	Small team access by CTV	As required
Major component replacement	Replacement of blades, gearboxes, transformers or generators	Jack-up vessel	14 Jack up events / annum
Painting	Application of paint or other coatings. Coatings on the blades and minor paint repairs to tower and nacelle	Technicians access by CTV	Yearly

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Table 4.29: Operational and maintenance activities - OSPs

Activity	Description	Methodology	Frequency
Routine inspections	Internal and external inspections of the OSP	Technicians access by CTV	Monthly visual inspection – One day per structure
Removal of guano	Removal of guano from the OSP	Pressure washer	One to two times per year
Replacement of consumables and minor components	Replacement of consumables (e.g. oils, lubricants) and minor components within the OSP	Technicians access by CTV	Replacement both on condition and on time basis
Major component replacement	Replacement of transformers, switchgear etc.	Jack-up barge or CTV	One to two replacements every 10 years.
Painting	Application of paint or other coatings	Technicians access by CTV	One visit per year

Table 4.30: Operational and maintenance activities - inter-array cables

Activity	Description	Methodology	Frequency
Routine inspections	Inspections of the cable and any cable protection including at their entry into J-tubes on offshore structures	Survey vessel or USV/ROV	Annually
Geophysical surveys	Survey of seabed and any cable protection	Survey vessel(s) or USV	Every six months for first two years and annually thereafter
Inter-array cable repair	Repair, reburial and replacement of inter-array cable	Cable vessel of Jack Up	1 every 3 years
Inter-array cable maintenance	Removal of excess seabed sediment	Vessels include Cable, Dredging and Support vessel	300,000 m3 every 5 years

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Table 4.31: Operational and maintenance activities - interconnector cables

Activity	Description	Methodology	Frequency
Routine inspections	Inspections of the cable and any cable protection including at their entry into J-tubes on offshore structures	Survey vessel or USV/ROV	Annually
Geophysical surveys	Survey of seabed and cable protection (if present).	Survey vessel or USV	Every six months for first two years and annually thereafter
Interconnector cable repair	Repair and replacement of interconnector cable	Cable vessel	1 every 3 years
Interconnector cable maintenance	Reburial / stabilisation of exposed interconnector cable section or removal of excess seabed sediment	Vessels include Cable, Dredging and Support vessel	100,000 m^3 every 5 years (across the interconnector cable and export cable)

Table 4.32: Operational and maintenance activities - offshore export cables

Activity	Description	Methodology	Frequency
Routine inspections	Inspections of the cable and any cable protection including at their entry into J-tubes on offshore structures	Survey vessel or USV/ROV	Annually
Geophysical surveys	Survey of seabed and any cable protection	Survey vessel or USV	Every six months for first two years and annually thereafter
Offshore export cable repair	Repair, reburial and replacement of offshore export cable	Shallow barges, amphibious solutions, Jack-Up or DP2 Vessel	1 every 5 years
Offshore export cable maintenance	Reburial / stabilisation of exposed offshore export cable section or removal of excess seabed sediment	Shallow barges, offshore support vessel, dredging vessel or amphibious solutions	100,000 m3 every 5 years (across the interconnector cable and export cable)

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4.4.5 Maintenance vessels and helicopters

4.4.5.1 A range of maintenance vessels will be used over the lifetime of the Proposed Development. In addition, it is possible that helicopters (operating from a licenced airfield) will be used for crew and equipment transfers, and for emergency response. Maintenance vessel and helicopter numbers are presented in Table 4.33. This provides an overview of the number of return trips per year during the operational and maintenance phase. Jack-up vessel footprint parameters for the operational and maintenance activities are as presented in Table 4.22.

Table 4.33: Anticipated maintenance vessel and helicopter parameters

Parameter	Number on site at any given time	Return trips (per year)
Vessels		
Crew Transfer Vessels/Workboats	10	1,225
Jack-up vessels	3	9
Cable repair vessels	3	6
Service Operation Vessels (SOV))	3	40
SOV daughter craft	4	8
Survey vessels	3	21
Excavators, rock dumper or dredger	4	50
Total Vessels	**30**	**1359**
Helicopters		
Helicopters	2	485
Total Helicopters	**2**	**485**

4.5 Decommissioning

4.5.1 Health and Safety

4.5.1.1 All project personnel and contractors will be required to be fully compliant with their responsibilities as defined by:

- The Safety, Health and Welfare at Work Act 2005;
- The Safety, Health and Welfare at Work (General Application) Regulations 2007 (as amended);
- The Safety, Health and Welfare at Work (Construction) Regulations 2013 (as amended);
- The Safety, Health and Welfare at Work (Diving) Regulations 2018 (as amended);
- The Safety, Health and Welfare at Work (Reporting of Accidents and Dangerous Occurrences) Regulations 2016 (S.I. No. 370 of 2016);
- The European Communities (EC) Act 1972 and related Regulations;
- The Chemicals Act 2008 and The Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001 (S.I. No. 619/2001) as amended;
- The Merchant Shipping Act 1894 & The Merchant Shipping (Investigation of Marine Casualties) Act, 2000
- The HSA ACoPS and Guidance publications
- Wind Energy Ireland ACoPS and Guidance publications
- G+ Offshore Wind Health & Safety Association guidance documents
- Code of practice for safe use of cranes BS 7121-1:2016
- Other applicable industry standards/best practice such as ISO, DNV, etc

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4.5.2 Removal of Infrastructure

4.5.2.1 At the end of the operational lifetime of the Proposed Development, all monopiles will be cut 2 m below seabed level.

4.5.2.2 The scour protection system will remain in place to prevent seabed lowering in the vicinity of the monopile location.

4.5.2.3 The Developer will, before the expiration of its MAC Consent (December 2067) rehabilitate the consent area and any other part of the maritime area adversely affected by the Proposed Development and the application for Development Permission has attached to it a Rehabilitation Schedule (Volume III, Appendix 4.1: Rehabilitation Schedule).

4.5.2.4 Table 4.34 sets out the anticipated decommissioning activities for the Proposed Development as set out in Volume III, Appendix 4.1: Rehabilitation Schedule. These activities have been considered in the AA Screening and assessed in the NIS.

Table 4.34: Decommissioning activities

Component	Decommissioning strategy
WTG components (tower, nacelle, blades)	Removed
OSP Topside	Removed
Foundations (WTG / OSP)	To be cut 2m below seabed level
Scour protection	To be left in situ
Inter-array, interconnector and offshore export cables	To be left in situ
Cable protection	To be left in situ

4.6 Advisory safety zones

4.6.1.1 During the construction and operational phases of the Proposed Development, it is standard practice to advise other mariners of clearance distances to be maintained around construction, operation and maintenance and decommissioning activities. A Vessel Management Plan (VMP) has been submitted with this Application (Volume III, Appendix 25.7).

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5 Environmental Baseline

5.1 Introduction

5.1.1.1 This section provides an overview of the environmental characteristics relevant to the receptors under consideration as part of the AA screening process, specifically:

- Marine and Coastal Habitat and Species QIs within SACs;
- Intertidal Ornithology and Waterbird SCIs for Intertidal SPAs; and
- Marine Species QIs and SCIs including Marine Mammals, Seabird Populations and Fish within marine SAC and SPAs.

5.1.1.2 Baseline information relevant to the determination of LSE relates to the Array Area the Cable Corridor and Working Area, the onshore export cable and onshore grid infrastructure (OGI),and the wider zone of influence (ZoI) across which designated sites are identified for consideration of potential LSE.

5.1.1.3 The information presented here draws on a wide range of data sources specific to each receptor, as outlined below. This section is intended to provide a brief summary of the existing baseline information only to inform this AA screening exercise. A more exhaustive review of baseline data is not required at this stage but will be compiled to inform subsequent Stage 2 assessments as required and building on the information collated to inform the NIS. Where site specific information is available (or planned) this is highlighted.

5.2 Marine and Coastal Habitat and Species QIs

5.2.1 Existing Data Sources

5.2.1.1 The following regional datasets provide the existing baseline for marine and coastal habitats and species.

- NPWS, NatureScot, JNCC and NRW protected sites data (2011 – 2023, a - p);
- Seabed Habitats of the Southern Irish Sea. In Seafloor Geomorphology as Benthic Habitat (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);
- Seabed mapping in the southern Irish Sea: predicting benthic biological communities based on sediment characteristics (McBreen *et al.,* 2008);
- Benthic surveys of sandbanks in the Irish Sea (Roche *et al.,* 2007);
- Proposed Dredge Disposal Sites for Arklow Harbour Commissioner (Aquafact International Services Ltd, 2008); and
- European Marine Observation and Data Network (EMODnet) broad-scale seabed habitat map for Europe (EMODnet, 2019).

5.2.1.2 In addition to the regional datasets listed above, several datasets from benthic subtidal and intertidal surveys, which were conducted between 2000 and 2021 for ABWP1 or other projects across the Array Area and Cable Corridor and Working Area, are available. These included pre-construction baseline surveys (prior to construction of the ABWP1 WTGs) undertaken in 2000 and 2001, a series of post-construction monitoring surveys undertaken over a period of eight years (2004 to 2011, inclusive) and a subtidal benthic ecology survey, conducted as part of the post-construction monitoring programme for ABWP1 in 2021. These site-specific monitoring

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surveys were focussed primarily on Arklow Bank and the area inshore, although some sampling was also undertaken to the east of Arklow Bank. The surveys are listed out below:

- ABWP1 baseline survey – June and September 2000, and April 2001;
- ABWP1 post-construction survey – June, July, and October 2004, June and November 2005, June 2006, May 2007, June 2009, June 2010, June 2011, and September 2021 and;
- Sediment chemistry sampling to support dredge dumping as sea permit application for ABWP1 – May 2016

5.2.1.3 Further to the above datasets, two other datasets have been considered from relevant sources which are applicable to the Arklow Bank area.

- Survey on proposed dredge disposal sites for the Arklow Harbour Commissioner – June 2007, and;
- Diversity of demersal and megafaunal assemblages inhabiting sandbanks of the Irish Sea – August 2007.

5.2.2 Site Specific Surveys

5.2.2.1 In addition to surveys conducted as part of ABWP1, site-specific geophysical surveys for the Proposed Development were undertaken across the Array Area and Cable Corridor and Working Area in 2019 and 2022. These data provide further characterisation information, including seabed feature and sediment types, which were considered alongside the ecological datasets.

5.2.2.2 An intertidal Phase I walkover survey and on-site dig-over sediment sampling of the landfall site, located to the south of Ennereilly Beach, was conducted in June 2019. The survey was conducted following guidance outlined in Davies *et al.,* (2001) and Wyn *et al.,* (2006), while habitats/biotopes were classified in accordance with Connor *et al.,* (2004). The surveys are listed out below:

- ABWP1 baseline survey – June and September 2000, and April 2001;
- ABWP1 post-construction survey – June, July, and October 2004, June and November 2005, June 2006, May 2007, June 2009, June 2010, June 2011, and September 2021;
- Survey on proposed dredge disposal sites for the Arklow Harbour Commissioner – June 2007;
- Diversity of demersal and megafaunal assemblages inhabiting sandbanks of the Irish Sea – August 2007;
- Sediment chemistry sampling to support dredge dumping as sea permit application for ABWP1 – May 2016;
- Intertidal Phase I walkover survey and on-site dig-over sediment sampling of the Landfall site for the Proposed Development – June 2019;
- Site-specific geophysical surveys of the Proposed Development Array Area and offshore export cable routes – July and August 2019; and
- Site-specific geophysical and hydrographic surveys of the Proposed Development Array Area and offshore export cable routes – August to November 2022.

5.2.3 Baseline

5.2.3.1 Arklow Bank, within the Array Area, consists of a highly mobile upper layer of sandy sediment which ranges from medium to coarse sand (Creane *et al.* 2023). The northern end of the Arklow Bank is characterised by sand habitat and cobbles with shells/pebbles, while the southern end of the Arklow Bank is characterised by fine sand (Fehily Timoney and Co, 2001; Panigrahi *et a*l., 2009). Keegan *et al.*, (1987) describes the seabed around Arklow Bank as having varying proportions of current-swept coarse sediments, consisting of compact sand, gravel, shell and/or cobbles.

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5.2.3.2 Site-specific geophysical surveys of the Array Area in 2019 identified boulder fields to the northeast of Arklow Bank, sandwaves to the south, and mobile sandy sediment across the bank itself (Ultrabeam Ltd., 2019). Patches of coarse sediment were also observed within the central conducted between 2004 and 2011, and in 2021 which found varying proportions of sand, gravelly sand and gravel in the north of Arklow Bank; predominately sand sediment with areas of gravel and mud in to the south; and slightly gravelly sand, with coarser gravelly sands characterising the eastern and western parts of the bank (HydroServ, 2004 to 2009; Aquatic Services Unit, 2010; GE Wind Energy, 2011 to 2012; GE Wind Energy, 2021).

5.2.3.3 Atalah *et al.* (2013) conducted beam trawls at three locations on Arklow Bank in 2007 (after the construction of ABWP1) and found that benthic communities were typical of those found across the east coast of Ireland. The most abundant taxa recorded included the hermit crab *Pagurus bernhardus*, the common starfish *Asterias rubens*, the elliptical surf clam *Spisula elliptica*, and the flying crab *Liocarcinus holsatus*.

5.2.3.4 Site-specific benthic surveys conducted in 2021 indicated the presence of low diversity communities. The four sites sampled within the Array Area were extremely species poor, with a total of 12 taxa (13 individuals) recorded (GE Wind Energy, 2021). Within these stations, the most abundant taxa were the polychaete *Eunereis longissima*, and the crustaceans *Gastrosaccus spinifer* and *Gammaropsis nitida*, with only two individuals recorded across stations. This is in contrast to three stations sampled just outside of the Array Area to the east, at which the total number of taxa recorded in samples was a lot higher ranging from 41 to 61 (186 to 706 individuals).

5.2.3.5 The number of taxa recorded at stations within the Array Area in 2021, were concordant with previous site-specific surveys (HydroServ, 2004 to 2009; Aquatic Services Unit, 2010; GE Wind Energy, 2011 to 2012) and desktop data, including observations made by Keegan *et al.*, (1987) and more recent mapping by Robinson *et al.,*. (2012). The only biotope that was recorded within the Array Area was 'Infralittoral mobile clean sand with sparse fauna' (JNCC code: SS.SSa.IFiSa.IMoSa; EUNIS code: MB5231), due to the lack of taxa recorded.

5.2.3.6 Discrete patches of the biotope '*Sabellaria spinulosa* on stable circalittoral mixed sediment' (JNCC code: SS.SBR.PoR.SspiMx; EUNIS code: MC2211) were identified due to the abundance of the Ross worm *Sabellaria spinulosa*. *S. spinulosa* is a common polychaete species found on all Irish and British coasts. It is most commonly found in low densities as a crust or as individuals that construct tubes from coarse, cemented sand or shell grains. Over some of its range it can form ephemeral and localised reefs up to several metres across and 60 cm high. At stations just outside of the Array Area, this biotope was not recorded in 2007 and 2011 (HydroServe, 2007b; GE Wind Energy, 2012), it was only recorded at one station in 2006 and 2021 (HydroServe, 2007a; GE Wind Energy, 2021), and at two stations in 2009 and 2010 (Aquatic Services Unit, 2010; GE Wind Energy, 2011).

5.2.3.7 Site-specific geophysical surveys of the Cable Corridor and Working Area in 2022 found that the distribution of sediments indicated predominant facies of medium to coarse sands which coincide with the presence of sandwaves, megaripples and sediment waves on the approach to Arklow Bank. Finer grained facies of sandy mud and clay were identified in troughs between sand wave crests (Green Rebel, 2022).

5.2.3.8 In contrast to stations sampled within the Array Area, site-specific benthic surveys conducted in 2021 within the Cable Corridor and Working Area indicated more diverse benthic communities, with a total of 116 taxa (533 individuals) recorded from the four sites sampled (GE Wind Energy, 2021). Within these stations the most abundant taxa were the wart barnacle *Verruca stroemia* (48 individuals), followed by polychaetes including *Ampharetidae* spp. (31 individuals), *Anobothrus gracilis* (29 individuals), *Spirobranchus lamarcki* (28 individuals) and *Dipolydora coeca* (27 individuals) and the common brittlestar *Ophiothrix fragilis* (27 individuals). All other taxa were recorded with an abundance of less than 20 individuals across stations. The number of taxa

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recorded at stations within the Cable Corridor and Working Area in 2021 were concordant with previous site-specific surveys (HydroServ, 2004 to 2009; Aquatic Services Unit, 2010; GE Wind Energy, 2011 to 2012) and desktop data (Keegan *et al.*, 1987; EUSeaMap); Robinson *et al.,* (2012).

5.2.3.9 Discrete patches of the biotope '*Sabellaria spinulosa* on stable circalittoral mixed sediment' (JNCC code: SS.SBR.PoR.SspiMx; EUNIS code: MC2211) were identified within the Cable Corridor and Working Area due to the abundance of S. spinulosa. Similar to the Array Area, this biotope is considered to be ephemeral at sites just outside of the Cable Corridor and Working Area. For instance, this biotope was recorded at only one site in 2006, 2007, 2009, and 2011 (HydroServe, 2007a; HydroServe, 2007b; Aquatic Services Unit, 2010; GE Wind Energy, 2012); and at two sites 2010 and 2021 (GE Wind Energy, 2011; GE Wind Energy, 2021).

5.2.3.10 The site-specific survey of the landfall site in 2019 indicated that the lower shore comprised rounded clean pebbles, which gave way to coarse to fine sand sediments on the mid-shore. The upper shore sediments were composed of a mixture of coarse sand and cobble with occasional patches of coarse to fine sand sediment. In general, lower and upper shore coarse sediments were characterised by the habitat 'barren littoral shingle' (JNCC code: LS.LCS.Sh.BarSh; EUNIS code: MA3211) and 'mid-shore sediments were characterised by the habitat 'barren littoral coarse sand' (JNCC code: LS.LSa.MoSa.BarSa; EUNIS code: MA5231), (RPS, 2019).

5.3 Intertidal Ornithology and Waterbirds

5.3.1 Existing Data Sources

5.3.1.1 The following data sources have been used to inform in the ornithological baseline for wader and wildfowl populations of Intertidal SPAs. The key data sources used to characterise the ZoI for intertidal bird species include existing literature and survey data as outlined below:

- NPWS, NatureScot, JNCC and NRW protected sites data (2011 – 2023, a - p);
- Irish Wetland Bird Survey: Results of waterbird monitoring in Ireland in 2016/17 and 2017/18 (Fitzgerald *et al.,* 2021);
- Waterbirds in the UK 2019/20 (Frost *et al.*, 2021);
- Local bird reports and atlases;
- Existing grey literature;
- Bird Atlas 2007-2011 (Balmer *et al.,* 2013);
- National Parks & Wildlife Service: Protected Sites in Ireland (NPWS, 2023);
- Birds in Europe: population estimates, trends and conservation status (BirdLife International, 2004);
- The Birds of the Western Palearctic (Cramp and Simmons 1977 – 1994);
- Handbook of the Birds of the World (Del Hoyo *et al.,* 1992 – 2011);
- Bird Facts: profiles of birds occurring in Britain and Ireland (Robinson, 2005);
- Birds in Ireland, (Hutchinson 2010); and
- The Migration Atlas: Movements of the birds of Britain and Ireland (Wernham *et al.,* 2002).

5.3.2 Site Specific Surveys

5.3.2.1 Site-specific surveys were commissioned to support the characterisation of the intertidal ornithology baseline. Surveys were undertaken between November 2019 and March 2020 for potential landfall sites at Johnstown North. Surveys consisted of monthly visits to two vantage points, undertaking three counts per visit of all species of wildfowl, waders and gulls utilising the intertidal zone and inshore waters.

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5.3.2.2 In addition, a visual assessment was conducted to determine the suitability of the cliffs to support breeding seabirds. This was carried out on 21st July 2020.

5.3.2.3 The information gathered from both surveys (Volume III, Appendix 12.11, Technical Report – Onshore Cable and Landfall Baseline Bird Survey) has been used to support the screening exercise.

5.3.3 Baseline

5.3.3.1 During the site-specific surveys, one species of wader, oystercatcher (*Haematopus ostralegus*) was recorded on four occasions between 5th November 2019 and 27th March 2020 inclusive. Birds were recorded from both vantage point (VP) locations, although peak count (19 birds), number of observations (recorded on four visits) and total number of birds recorded (29 birds) were greater at VP-C. At VP-B oystercatcher was recorded on two occasions with a peak count of two birds and the total number of birds recorded throughout the surveys was three. No other waders or wildfowl were recorded from the proposed landfall location.

5.3.3.2 The visual assessment that was undertaken to determine the suitability of the cliffs for breeding seabirds detected no breeding seabirds, nor signs of occupation and the habitat was considered to be of low suitability.

5.4 Marine Mammals

5.4.1 Existing Data Sources

5.4.1.1 The following regional datasets provide the existing baseline for marine mammals:

- NPWS, NatureScot, JNCC and NRW protected sites data (2011 – 2023, a - p);
- Aerial thermal imagery surveys conducted by NPWS in 2003 (Cronin *et al.,* 2004);
- Seal counts from aerial imagery surveys conducted by NPWS in 2005 (O'Cadhla *et al*., 2007);
- Irish cetacean review by the Irish Whale and Dolphin Group (IWDG) 2000 to 2009 (Berrow *et al*., 2010);
- Atlas of marine mammals in Irish offshore waters 2005 to 2011 by the IWDG (Wall *et al*., 2013);
- Marine mammal surveys by NPWS and IWDG 2008 to 2011 (Berrow *et al*., 2008; 2013);
- Inshore surveys for cetaceans by the IWDG (Berrow *et al*., 2011);
- Aerial thermal imagery surveys by NPWS in 2011 to 2012 (Duck and Morris 2013);
- 'ObSERVE' programme aerial data from the Department of Communications, Climate Action and Environment (DCCAE) and NPWS in 2015 to 2017 (Rogan *et al*., 2018);
- Aerial thermal imagery surveys by NPWS in 2017 and 2018 (Morris and Duck 2019);
- Harbour and grey seals at sea usage maps by Sea Mammal Research Unit (SMRU) from 2005 to 2019 (Carter *et al*., 2022);
- Modelled distributions and abundances of cetaceans of Wales and surrounding waters by Natural Resources Wales (NRW) from 1990 to 2020 (Evans and Waggitt 2023);
- Biodiversity maps for Ireland created by National Biodiversity Data Centre (NBDC) (NBDC online mapping tool[3]);
- Management Units for cetaceans by Joint Nature Conservation Committee (JNCC) (IAMMWG 2023);

[3] https://maps.biodiversityireland.ie/Map

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- Atlas of Cetacean Distribution in North-west European Waters 'Joint Cetacean Database' (Reid *et al.,* 2003);
- Sympatric Seals, Satellite Tracking and Protected Areas: Habitat-Based Distribution Estimates for Conservation and Management (Carter *et al.,* 2022);
- Habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles (Carter *et al.,* 2020);
- Harbour porpoise densities (Heinänen and Skov, 2015);
- Joint Cetacean Protocol (JCP) Phase III (Paxton *et al.,* 2016);
- Sea Watch Foundation data;
- Small Cetacean Abundance in the Atlantic and North Sea (SCANS II), (SMRU, 2006);
- Small Cetacean Abundance in the North Sea and Adjacent Waters (SCANS II and SCANS III) (Hammond *et al.,* 2021, Lacey *et al.,* 2022, and SCANS, 2006 - 2021);
- Special Committee on Seals series (SCOS 2021; 2022); and
- SCANS-IV (Gilles *et al*., 2023).

5.4.2 Site Specific Surveys

5.4.2.1 Site-specific surveys were commissioned to support the marine mammal baseline for the ABWP1 planning application. These were boat-based visual surveys (2000-2009) and a Passive Acoustic Monitoring (PAM) campaign (2002). Additional surveys, in the form of Digital Aerial Surveys (DAS), were undertaken from 2018 to 2020 to gather more recent data as part of site characterisation for the Proposed Development EIAR. Additionally, geophysical surveys were carried out during site investigation work for the Proposed Development in 2019 and 2020 and, as part of the mitigation protocol for those surveys, a marine mammal observer (MMO) was on board who reported any sightings to NPWS. These sightings are summarised in reports by IWDG (2019) and Gavin & Doherty Geosolutions Ltd (2020a and 2020b). All data from these site-specific surveys are used to inform the baseline presented below.

5.4.3 Baseline

5.4.3.1 Based on all the available sources above there are seven marine mammal species considered likely to be present within the area surrounding the Proposed Development. This includes all four Annex II marine mammal species; *harbour porpoise (Phocoena phocoena)*, bottlenose dolphin *Tursiops truncatus*, grey seal *Halichoerus grypus*, and harbour seal *Phoca vitulina*. Harbour porpoise is the most commonly occurring cetacean species in UK and Irish waters, with harbour porpoise within the Celtic and Irish Sea Management Unit (MU) having an estimated abundance of 62,517 (95% CI: 48,324 – 80,877, CV: 0.13) (IAMMWG, 2022). The highest density was obtained from the site-specific DAS surveys, which obtained an average absolute harbour porpoise density estimate of 0.38 animals/km^2. The estimated abundance for bottlenose dolphins is 293 (95% CI: 108-793, CV: 0.54) within the Irish Sea MU (IAMMWG, 2022), and the highest density was obtained from SCANS-IV which obtained an average absolute bottlenose dolphin density estimate of 0.2352 animals/km^2. Harbour porpoise and bottlenose dolphin were both observed at the Proposed Development site during the site-specific surveys.

5.4.3.2 The region supports breeding populations of grey seal, with the closest haul-out to the Proposed Development on the coast at Arklow (Duck and Morris, 2013; Morris and Duck, 2019). Grey seals also haul-out at nearby established breeding colonies at Lambay Island to the north of the Proposed Development, and at Wexford Harbour to the south of the Proposed Development (Duck and Morris, 2013; Morris and Duck, 2019). Grey seals have a typical foraging range of 100 km, this has been used as the search area to identify sites to include within this assessment (Carter *et al.,* 2022). Grey seal breeding surveys conducted from 2009 to 2012 found that, compared to the Atlantic coast, pup production was considerably lower off the mainland coasts of Cork, Wicklow and Wexford compared to counties along the Atlantic coast (O'Cadhla *et al.,*

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2013). A total of 1,574 grey seal pups were estimated from around the coast of the Republic of Ireland during the 2005 breeding season (O'Cadhla *et al.,* 2007). This equated to a total population estimate of grey seals in Irish Waters of 5,509 to 7,083 animals (O'Cadhla *et al.,* 2007). Using additional data collected in 2007, O'Cadhla and Strong (2007) estimated a total of 5,343 grey seals across all Irish haul-out sites and therefore suggested that this figure should represent a minimum population estimate. More recently, the University of St. Andrews' Sea Mammal Research Unit (SMRU) carried out an aerial survey of grey and harbour seals around the coast of Ireland in August 2017 and 2018. This survey estimated the total count of 3,698 grey seals, of which 418 occurred at haul-outs in the east region of Ireland (western Irish Sea) (Morris and Duck, 2019). This is a minimum population estimate since it does not account for the proportion of the population that would be at sea during the counts. Up to 23.9% of the population of grey seals are likely to be hauled-out during the August count (Russell *et al.,* 2016); population size of the East region of Ireland has been scaled by estimating the average proportion of grey seals hauled-out at the time of survey (25.15%, 95% CI: 25.45 – 29.07%) (SCOS, 2022), resulting in an estimate of 1,662 individuals. However, no grey seals were recorded in the portion of the survey region which overlaps with the Proposed Development (Morris and Duck, 2019). For the breeding site at Arklow, the estimated number of grey seals in the colony was in the range 21 to 150 (O'Cadhla and Strong, 2007). It was not possible to provide an abundance and/or density estimate for grey seal from the site-specific DAS due to the low number of sightings across the survey period and is it consider that the likelihood of grey seal being present within the relevant ZoI is low. Telemetry data from grey seals tagged in UK waters has shown connectivity between the east and north coasts of Ireland, Wales, Southwest England, and the southwest coast of Scotland (Carter *et al.*, 2020). The average grey seal density across grid cells within the Array Area and Cable Corridor and Working Area is 0.08 animals/km^2 (extracted from Carter *et al.,* (2020)).

5.4.3.3 The region also supports populations of harbour seal; however, they are less common than grey seal. The closest haul-out to the Proposed Development is on the coast at North Bull Island to the south of Dublin Bay (Duck and Morris, 2013). The Proposed Development lies just beyond the typical foraging range for this species (50 km from their haul-out sites) (Carter *et al.,* 2022). Across the Array Area and the Cable Corridor and Working Area, one animal was sighted during the historical site-specific boat-based surveys in 2003, whilst only two harbour seals were identified during the more recent site-specific DAS in August 2018, although 27 'seal species' were recorded. Analyses of aerial survey and ground count data collected in 2003 yielded a minimum count for the Republic of Ireland of 2,955 harbour seals (Cronin *et al.,* 2004). When the proportion of seals that were not hauled out was accounted for, the total population estimate in 2003 was 6,950 (Cosgrove *et al.,* 2016). This has since been updated by land and boat-based surveys undertaken in 2009, 2010 and 2011 by NPWS, which reported a generally stable population, with only slight regional increases and decreases (NPWS, 2012). It was not possible to provide an abundance and/or density estimate for harbour seal from the site-specific DAS due to the low number of sightings across the survey period.

5.5 Seabird Populations of SPAs

5.5.1 Existing Data Sources

5.5.1.1 The following regional datasets provide the existing baseline for seabirds;

- NPWS, NatureScot, JNCC and NRW protected sites data (2011 – 2023, a - p);
- Seabird Populations of Britain and Ireland (Mitchell *et al.,* (2004));
- Nonbreeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales (BDMPS) (Furness, 2015);

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- Birds in Europe: population estimates, trends and conservation status (BirdLife International, 2004);
- Population estimates on birds in Great Britain and the United Kingdom (Musgrove *et al.,* 2013);
- Waterbirds in the UK 2018/19: The Wetland Bird Survey (Frost *et al.,* 2020);
- Desk-based revision of seabird foraging ranges used for Habitats Regulations Assessment (HRA) screening (Woodward *et al.,* 2019);
- Foraging ranges of northern gannets *Morus bassanus* in relation to proposed offshore windfarms in the UK: (Langston *et al.,* 2010);
- The Birds of the Western Palearctic (Cramp and Simmons 1977 – 1994);
- Handbook of the Birds of the World (Del Hoyo *et al.,* 1992 – 2011);
- Bird Facts: profiles of birds occurring in Britain and Ireland (Robinson 2005);
- An atlas of seabird distribution in north-west European waters (Stone *et al.,* 1995);
- Birds in Ireland T and AD Poyser, (Hutchinson 2010);
- The Migration Atlas: Movements of the birds of Britain and Ireland (Wernham *et al.,* 2002);
- Seabird foraging ranges as a preliminary tool for identifying Marine Protected Areas (Thaxter *et al.,* 2012);
- Seabird Population Trends and Causes of Change (JNCC, 2018);
- Effects of offshore windfarms on the energy demands of seabirds (Speakman *et al.,* 2009);
- 2015 to 2016 ObSERVE aerial seabird survey data collected between 2015 and 2016 across all Exclusive Economic Zone (EEZ) waters surrounding the Republic of Ireland (Department of Communications, Climate Action and Environment in partnership with the Department of Culture, Heritage and the Gaeltacht);
- Assessing the impacts of windfarms on birds Ibis (Drewitt and Langston, 2006);
- Trapped within the corridor of the southern North Sea: the potential impact of offshore windfarms on seabirds Birds and Windfarms (Stienen *et al.,* 2007);
- Vulnerability of Scottish seabirds to offshore wind turbines (Furness and Wade, 2012);
- Rare breeding birds in the United Kingdom in 2009 (Holling and Rare Breeding Birds Panel., 2011);
- An analysis of the numbers and distribution of seabirds within the British Fishery Limit aimed at identifying areas that qualify as possible marine SPAs (Kober *et al.,* 2010).

5.5.2 Site Specific Surveys

5.5.2.1 Aerial surveys across the Array Area, a 4 km buffer and the area of sea between the Array and the shore commenced in March 2018 and 25 months of data collection was complete in April 2020. The full 25-month dataset was used for this screening exercise including data from two surveys in each calendar month except July in which three surveys were carried out. The data collected during these surveys have been used to identify the species present and their seasonal abundance.

5.5.2.2 Where appropriate, reference has also been made to monitoring data collected between 2000 and 2010 in relation to ABWP1.

5.5.3 Baseline

5.5.3.1 DAS were conducted across the site between March 2018 and April 2020. These have recorded 22 seabird, sea duck and diver species. Seasonal patterns of abundance vary between species, however some broad trends are apparent. Overall abundance was highest in August, in keeping with passage movements of birds during post-breeding dispersal and migration from breeding colonies around the Irish Sea, and lowest in June, indicating that the windfarm site appears to be of relatively low importance for breeding seabirds. Between September and February overall

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abundance was very similar in all months, although the species composition differed during these months. The following species accounts are a high-level summary of the estimated abundance values.

5.5.3.2 Two Arctic skuas (*Sterna paradisaea*) were recorded in the 4 km buffer surrounding the Array Area in September 2018. The estimated mean peak population was ten in September. No individuals were recorded in the Array Area itself. Arctic terns were recorded in April and May, and August to October within the Array Area. The estimated mean peak population was 3,230 in August. Birds allocated to the Arctic/common tern high-level species group were also recorded in April, May, August and September within the Array Area as well as in July within the Array Area 4 km buffer. The estimated mean peak population of Arctic/common terns within the Array Area was 540 in August.

5.5.3.3 Black-headed gulls (*Chroicocephalus ridibundus*) were recorded in January, February, July, August and October to December within the Array Area. The estimated mean peak population was 600 in February. Birds allocated to the small gull high-level species group were recorded in all calendar months except May, July and August within the Array Area, although they were recorded within the Array Area 2 km buffer in May. The estimated mean peak population of small gulls in the Array Area was 535 in January.

5.5.3.4 Common gulls (*Larus canus*) were recorded in January to April, June and November to December within the Array Area as well as May and July within the Array Area 2 km buffer. The estimated mean peak population in the Array Area was 2,230 in February. Birds allocated to the small gull high-level species group were recorded in all calendar months except May, July and August within the Array Area, although they were recorded within the Array Area 2 km buffer in May. The estimated mean peak population of small gulls in the Array Area was 535 in January.

5.5.3.5 Common scoters (*Melanitta nigra*) were recorded in January, June and December within the Array Area as well as May and October within the Array Area 4 km buffer. The estimated mean peak population was 20 in December.

5.5.3.6 Common terns (*Sterna hirundo*) were recorded in April, August and September within the Array Area as well as May and July within the Array Area 4 km buffer. The estimated mean peak population in the Array Area was 870 in August. Birds allocated to the Arctic/common tern high-level species group were recorded in April, May, August and September within the Array Area as well as in July within the Array Area 4 km buffer. The estimated mean peak population of Arctic/common terns within the Array Area was 540 in August.

5.5.3.7 Cormorants (*Phalacrocorax carbo*) were recorded in January, September and October within the Array Area as well as February within the Array Area 2 km buffer and June within the Array Area 4 km buffer. The estimated mean peak population in the Array Area was ten in October. Birds allocated to the cormorant/shag high-level species group were recorded in March, May and December within the Array Area and in April within the Array Area 4 km buffer. The estimated mean peak population in the Array Area was ten in March, May and December.

5.5.3.8 Fulmars (*Fulmarus glacialis*) were recorded in April and September within the Array Area as well as July and August within the Array Area 2 km buffer and January and June within the Array Area 4 km buffer. The estimated mean peak population in the Array Area was ten in September.

5.5.3.9 Gannets (*Morus bassanus*) were recorded within the Array Area in all months except February, April and May; this species was recorded within the Array Area 2 km buffer in April and May. The estimated mean peak population in the Array Area was 35 in October.

5.5.3.10 Great black-backed gulls (*Larus marinus*) were recorded in January, September, November and December within the Array Area as well as March within the Array Area 2 km buffer and July and October within the 4 km buffer. The estimated mean peak population in the Array Area was 20 in January.

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5.5.3.11 Great northern divers (*Gavia immer*) were recorded in January and December within the Array Area. The estimated mean peak population was ten in January and December. Birds allocated to the diver high-level species group were recorded in February within the Array Area with an estimated mean peak population of 20.

5.5.3.12 Guillemots (*Uria aalge*) were recorded in all calendar months within the Array Area. The estimated mean peak population was 4,197 in January. Birds allocated to the auk high-level species group were also recorded in all calendar months within the Array Area with an estimated mean peak population of 975 in January.

5.5.3.13 Herring gulls (*Larus argentatus*) were recorded in February and November within the Array Area as well as March, June and July within the Array Area 2 km buffer and January within the Array Area 4 km buffer. The estimated mean peak population in the Array Area was 15 in November.

5.5.3.14 Kittiwakes (*Rissa tridactyla*) were recorded in all calendar months within the Array Area. The estimated mean peak population was 7,390 in February. Birds allocated to the small gull high-level species group were recorded in all calendar months except May, July and August within the Array Area, although they were recorded within the Array Area 2 km buffer in May. The estimated mean peak population of small gulls in the Array Area was 535 in January.

5.5.3.15 Lesser black-backed gulls (*Larus fuscus*) were recorded in March within the Array Area. The estimated mean peak population was five in March.

5.5.3.16 Little gulls (*Hydrocoloeus minutus*) were recorded in January to March and August to December within the Array Area, this species was also recorded in July with the Array Area 2 km buffer. The estimated mean peak population in the Array Area was 1,045 in December.

5.5.3.17 Three little terns (*Sternula albifrons*) were recorded flying in the wider area during aerial surveys in July 2019, but no individuals were recorded in the Array Area or the Array Area 2 km or 4 km buffers.

5.5.3.18 Manx shearwaters (*Puffinus puffinus*) were recorded in April to September within the Array Area. The estimated mean peak population was 1,015 in August.

5.5.3.19 Puffins (*Fratercula arctica*) were recorded in February, March, June, July and August within the Array Area as well as November within the Array Area 2 km buffer and April, May and September within the Array Area 4 km buffer. The estimated mean peak population in the Array Area was 20 in March. Birds allocated to the auk high-level species group were recorded in all calendar months within the Array Area with an estimated mean peak population of 975.

5.5.3.20 Razorbills (*Alca torda*) were recorded in all calendar months within the Array Area. The estimated mean peak population was 3,313 in January. Birds allocated to the auk high-level species group were also recorded in all calendar months within the Array Area with an estimated mean peak population of 975 in January.

5.5.3.21 Red-throated divers (*Gavia stellata*) were recorded in January to May and October to December within the Array Area. The estimated mean peak population was 115 in January. Birds allocated to the diver high-level species group were recorded in February within the Array Area with an estimated mean peak population of 20.

5.5.3.22 Sandwich terns (*Thalasseus sandvicensis*) were recorded in May, August and September within the Array Area as well as April within the Array Area 2 km buffer. The estimated mean peak population in the Array Area was 15 in September.

5.5.3.23 Shags (*Gulosus aristotelis*) were recorded in January to March and October to December within the Array Area as well as May and August within the Array Area 4 km buffer. The estimated mean peak population in the Array Area was 35 in February. Birds allocated to the cormorant/shag high-level species group were recorded in March, May and December within the Array Area and in

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April within the Array Area 4 km buffer. The estimated mean peak population of cormorant/shag in the Array Area was ten in March, May and December.

5.6 Migratory Fish

5.6.1 Existing Data Sources

5.6.1.1 The following regional datasets provide the existing baseline for migratory fish;

- The National Biodiversity Data Centre Biodiversity Maps;
- FishBase species accounts (2023a – j);
- International Council for the Exploration of the Sea (ICES) Division VIIa technical reports series;
- Inland Fisheries Ireland monitoring reports (IFI, 2015; IFI, 2018a; IFI, 2018b; IFI, 2022a; IFI, 2022b);
- NPWS, NatureScot, JNCC and NRW protected sites data (2011 – 2023, a - p);
- Data derived from Northeast Atlantic groundfish data from scientific trawl surveys (Lynam and Riberio 2022);
- Habitats Directive and Red Data Book Fish Species Reports (Gallagher *et al.,* 2023);
- Shellfish Stocks and Fisheries Review 2022 (Marine Institute and Bord Iascaig Mhara, 2022);
- UK sea fisheries annual statistics report 2020 (MMO, 2021);
- EMODnet broad-scale seabed habitat map for Europe (EMODnet, 2019);
- Celtic Seas ecoregion fisheries overview (ICES, 2018);
- Long-term satellite tracking reveals variable seasonal migration strategies of basking sharks in the north-east Atlantic (Doherty *et al.,* 2017);
- Celtic Sea Trout Project (CSTP, 2016);
- Ireland Red List (No. 11) (Clarke *et al.,* 2016);
- The distribution of blue whiting west of the British Isles and Ireland (Gastauer *et al.,* 2016);
- Geology of the seabed and shallow subsurface: The Irish Sea (Mellet *et al.,* 2015);
- Slaney River Valley Special Area of Conservation (SAC). Site Synopsis (Site Code: 000781) (Department of Arts, Heritage and the Gaeltacht (DAHG), 2015);
- Diversity of demersal and megafaunal assemblages inhabiting sandbanks of the Irish Sea (Atalah *et al.,* 2013);
- An Inventory of Irish Herring Spawning Grounds (O'Sullivan *et al.,* 2013);
- Spawning and nursery grounds of selected fish species in UK Waters (Ellis *et al.,* 2012);
- An Offshore Windfarm on the Kish and Bray Banks, Environmental Impact Statement, Section 8: Marine Ecology (Dublin Array Offshore Windfarm, 2012);
- Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish (King *et al.,* 2011);
- Marine turtles in Irish waters (King and Berrow, 2009);
- Spatial distribution patterns of basking sharks on the European shelf: preliminary comparison of satellite-tag geolocation, survey and public sightings data (Southall *et al.,* 2005);
- The distribution of chondrichthyan fishes around the British Isles and implications for conservation (Ellis *et al.,* 2005);
- Distribution and relative abundance of demersal fishes from beam trawl surveys in the Irish Sea (ICES Division VIIa) 1993–2001 (Parker-Humphreys, 2004);
- Offshore Windfarm at Codling Bank, Non-Technical Summary (Codling Wind Park., 2002);
- Demersal assemblages in the Irish Sea, St George's Channel and Bristol Channel (Ellis *et al.,* 2000); and
- Fisheries Sensitivity Maps in British Waters (Coull *et al.,* 1998).

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5.6.2 Site Specific Surveys

5.6.2.1.1 Existing data from the desktop study was sufficient for the Proposed Development due to the presence of a number of recent beam and otter trawl data sets (e.g. Atalah *et al.,* 2013 and Lynam and Ribeiro, 2022) and as such site-specific fish and shellfish surveys were not considered necessary. However, site specific data collected as part of benthic surveys for ABWP1 and the Proposed Development provide further information on the fish and shellfish ecology of the area. Relevant site-specific surveys are listed below:

- Digital aerial marine mammal and bird surveys for Proposed Development - March 2018 to April 2020;
- GE Wind Energy. Post-construction surveys for ABWP1 - June 2010 to September 2021;
- Post-construction surveys for ABWP1 - June 2004 to May 2008, and June 2009; and
- Baseline/pre-construction surveys for ABWP1 - June and September 2000, and April 2001.

5.6.3 Baseline

5.6.3.1 Using the information sources listed above, there are a number of fish species identified to migrate through the area surrounding the Proposed Development that were considered to be of conservation interest and of relevance to the Offshore Windfarm. These include the Annex II species Atlantic salmon *Salmo salar*, river lamprey *Lampetra fluviatilis*, sea lamprey *Petromyzon marinus*, and twaite shad *Alosa fallax*. Brook lamprey *L. planeri* are also an Annex II species which is designated within a number of European Sites, however this species only migrates between rivers and does not migrate in the ocean and therefore will not be located within the Array Area or Cable Corridor and Working Area.

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6 Stage 1 Screening Appraisal, Consideration of Significant Effect Alone

6.1 Directly connected with or necessary to the management of the site

6.1.1.1 The Proposed Development holds a MAC granted in 2022. The Proposed Development is not directly connected with or necessary to the management of any European Site and is therefore subject to AA.

6.2 European Sites

6.2.1.1 Given the location of the Proposed Development within the marine environment, and the wide range of European Sites that are within the ZoIs for the Proposed Development and connected to the Array Area by open water, a range of criteria have been used to identify the European Sites to be considered within the Stage 1 screening for AA. The criteria used varies between receptor types and is based on industry standard precautionary ranges. These ranges are as follows:

- A 50 km buffer has been selected as the ZoI for European Sites which only include Annex I habitat QIs and wetland habitats of SPAs, to ensure that features of European Sites that can potentially be affected at great distances are not automatically excluded by selecting a narrower range of sites to scope. This buffer has been selected as it is considered that there would be a negligible effect beyond 50 km from the Proposed Development once any impacts have been apportioned to the relevant SPAs (see Wright *et al.*, 2012 for additional context);
- For European Sites which include migratory fish as QIs, the ZoI has been defined as the Western Irish Sea region, which is equivalent to the Western Irish Sea Fish, Shellfish and Sea Turtle ZoI (ABWP2 Scoping Report, 2023). This area includes the western portion of the Irish Sea along the east coast of Ireland including Carnsore Point (73.82 km south of the Array Area);
- For European Sites which include coastal and marine habitats as QIs, all sites within a 21 km buffer of the Proposed Development have been considered (based on the potential tidal excursion at the site);
- For European Sites which include harbour porpoise and bottlenose dolphin as QIs, all sites within the relevant species-specific MU have been considered. MU boundaries are based on best scientific understanding of the structure of biological populations and ecological differentiation within species specific populations, also taking into account political boundaries and the management of human activities (as defined by IAMMWG, 2023). This includes the Irish Sea MU for bottlenose dolphin and the Celtic and Irish Seas MU for harbour porpoise;
- For European Sites which include harbour seal and grey seal, the typical foraging distance for these species from the SACs has been used as the ZoI along with considerations of telemetry data where available to establish the extent of connectivity to the sites. Grey seal have a typical foraging range of 100 km and harbour seals have a typical foraging range of 50 km (Carter *et al.*, 2022); and
- For European Sites which are classified for their seabird populations (i.e., SPAs), all sites for which the Proposed Development is located within their mean maximum foraging range as listed by Woodward *et al.,* (2019) have been considered. Mean-maximum foraging ranges during the breeding season, based on seabird tracking data, are used to highlight potential connectivity between breeding colonies and offshore windfarms and, therefore, the potential for any negative population-level effects. The use of foraging ranges presented in Woodward

Sample

et al., (2019) are currently considered the most robust and representative of UK and Irish populations. This method, which captures sites within mean maximum foraging + 1 standard deviation has been presented to NPWS and is consistent with the approach taken for UK offshore wind projects.

6.2.1.2 In total, 92 European Sites are considered within this appraisal. Details in relation to the QIs and SCIs of these European Sites are provided in Table 8.1 in the case of SACs and are illustrated in Table 8.2 in the case of SPAs.

6.2.1.3 Having firstly determined that the Proposed Development is not directly connected with or necessary to the management of any European Sites (section 6.1), the identified European Sites have been screened against the activities of the Proposed Development in order to appraise whether or not its construction, operation and maintenance, and decommissioning phases are likely to have a significant effect on any of those European Sites.

6.2.1.4 The information contained in these tables is based on publicly available data on these European Sites which, along with the most up-to-date COs for the European Sites under consideration have been sourced from the relevant SNCB in March 2024.

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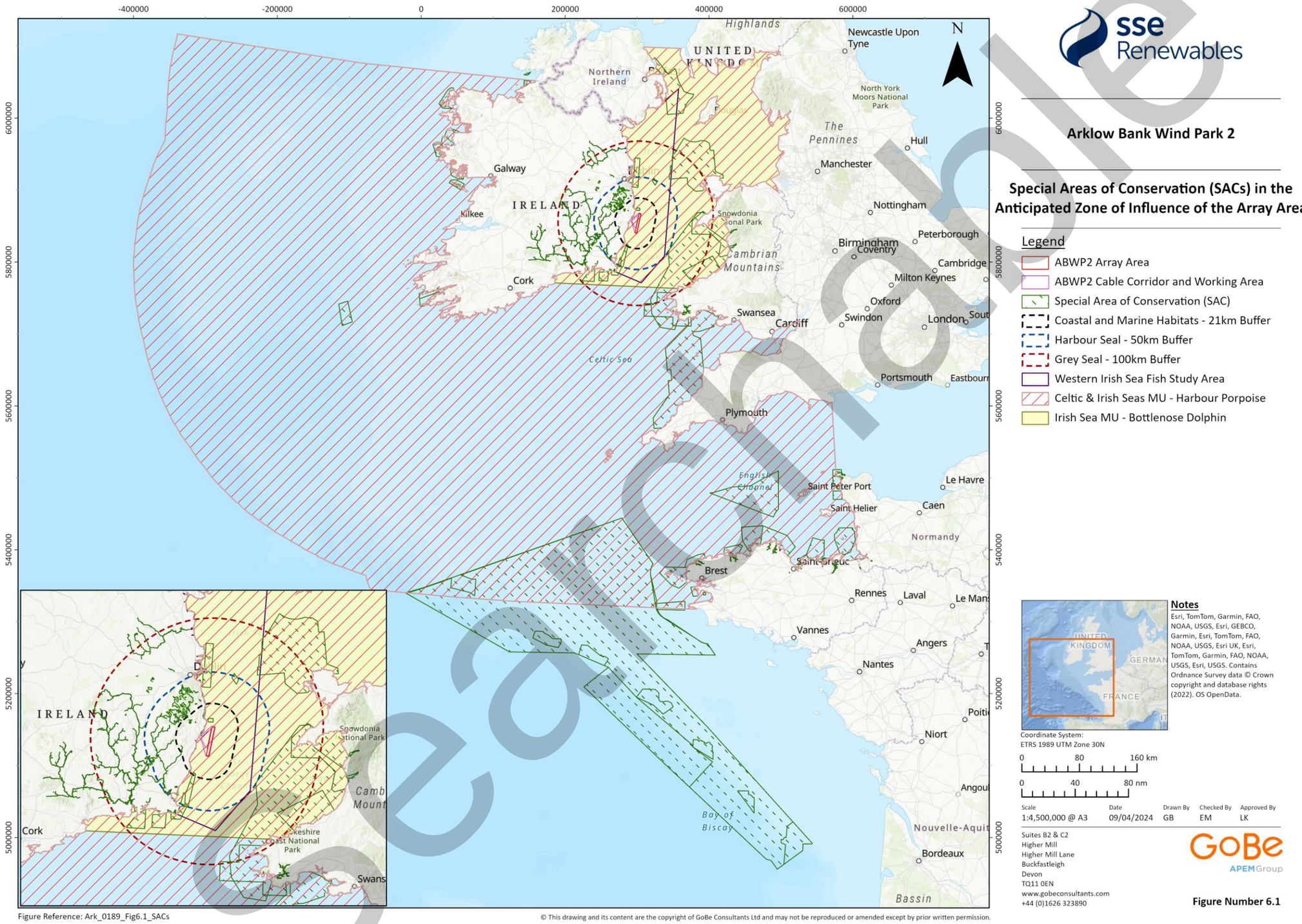


Figure Reference: Ark_0189_Fig6.1_SACs

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Arklow Bank Wind Park 2

Special Areas of Conservation (SACs) in the Anticipated Zone of Influence of the Array Area

Legend

- ABWP2 Array Area
- ABWP2 Cable Corridor and Working Area
- Special Area of Conservation (SAC)
- Coastal and Marine Habitats - 21km Buffer
- Harbour Seal - 50km Buffer
- Grey Seal - 100km Buffer
- Western Irish Sea Fish Study Area
- Celtic & Irish Seas MU - Harbour Porpoise
- Irish Sea MU - Bottlenose Dolphin

Notes

Esri, TomTom, Garmin, FAO, NOAA, USGS, Esri, GEBCO, Garmin, Esri, TomTom, FAO, NOAA, USGS, Esri UK, Esri, TomTom, Garmin, FAO, NOAA, USGS, Esri, USGS. Contains Ordnance Survey data © Crown copyright and database rights (2022). OS OpenData.

Coordinate System:
ETRS 1989 UTM Zone 30N

0 80 160 km

0 40 80 nm

Scale	Date	Drawn By	Checked By	Approved By
1:4,500,000 @ A3	09/04/2024	GB	EM	LK

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Figure Number 6.1

Figure 6.1: Special Areas of Conservation (SACs) in the Zone of Influence of the Proposed Development along with sites identified for receptor groups.

Sea Scale

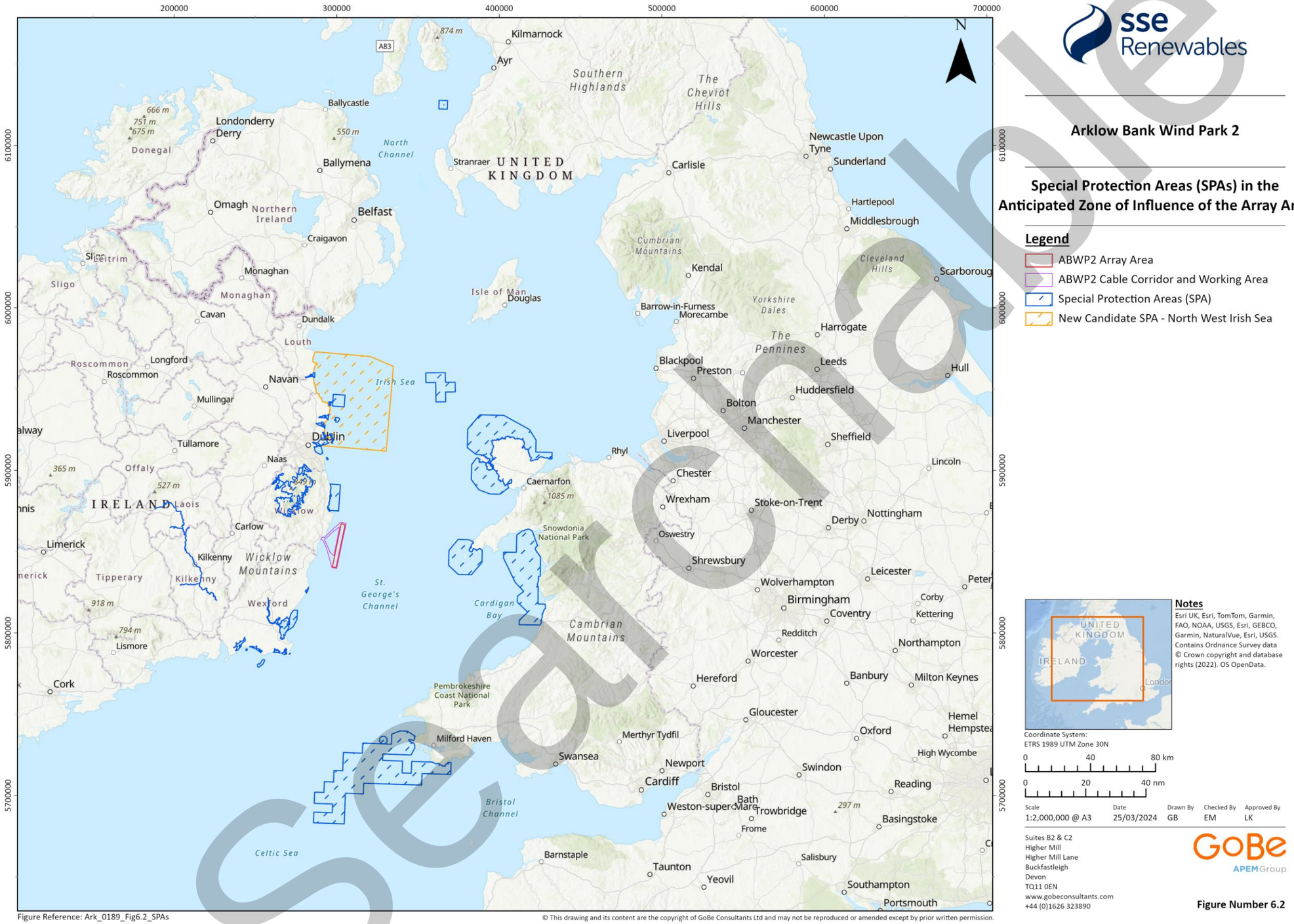


Figure Reference: Ark_0189_Fig6.2_SPAs

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Arklow Bank Wind Park 2

Special Protection Areas (SPAs) in the Anticipated Zone of Influence of the Array Area

Legend

- ABWP2 Array Area
- ABWP2 Cable Corridor and Working Area
- Special Protection Areas (SPA)
- New Candidate SPA - North West Irish Sea

Notes

Esri UK, Esri, TomTom, Garmin, FAO, NOAA, USGS, Esri, GEBCO, Garmin, NaturalVue, Esri, USGS. Contains Ordnance Survey data © Crown copyright and database rights (2022). OS OpenData.

Coordinate System:
ETRS 1989 UTM Zone 30N

0 40 80 km

0 20 40 nm

Scale	Date	Drawn By	Checked By	Approved By
1:2,000,000 @ A3	25/03/2024	GB	EM	LK

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Figure Number 6.2

Figure 6.2: Special Protection Areas (SPAs) in the Zone of Influence of the Array Area

Sea Scale

Table 6.1: SACs within the precautionary ZoI applied for assessment of effects from the Proposed Development (note: distances shown are from the closest element of the Array Area)

Site name	Qualifying Interest (QI)	Distance and direction of European Site from the Proposed Development	
		Array Area	Cable Corridor and Working Area
Irish SACs			
Buckroney-Brittas Dunes and Fen SAC	Annual vegetation of drift lines [1210] Perennial vegetation of stony banks [1220] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) [2150] Dunes with Salix repens ssp. Argentea (*Salicion arenariae*) [2170] Humid dune slacks [2190] Alkaline fens [7230]	7.12 km N	0.31 km N
Wicklow Reef SAC	Reefs [1170]	4.52 km N	3.61 km N
Magherabeg Dunes SAC	Annual vegetation of drift lines [1210] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) [2150] Petrifying springs with tufa formation (*Cratoneurion*) [7220]	5.85 km W	3.66 km W

Searchable

Site name	Qualifying Interest (QI)	Distance and direction of European Site from the Proposed Development	
		Array Area	Cable Corridor and Working Area
Kilpatrick Sandhills SAC	Annual vegetation of drift lines [1210] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) [2150]	10.54 km W	6.8 km W
The Murrough Wetlands SAC	Annual vegetation of drift lines [1210] Perennial vegetation of stony banks [1220] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210] Alkaline fens [7230]	12.28 km NW	11.15 km NW
Cahore Polders and Dunes SAC	Annual vegetation of drift lines [1210] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190]	18.77 km SW	18.19 km SW
Blackwater Bank SAC	Sandbanks which are slightly covered by sea water all the time [1110]	19.76 km S	19.76 km S
Kilmuckridge-Tinnaberna Sandhills SAC	Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]	40.22 km SW	35.34 km SW

Searchable

Site name	Qualifying Interest (QI)	Distance and direction of European Site from the Proposed Development	
		Array Area	Cable Corridor and Working Area
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]		
Slaney River Valley SAC	Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0] *Margaritifera margaritifera* (freshwater pearl mussel) [1029] *Petromyzon marinus* (sea lamprey) [1095] *Lampetra planeri* (brook lamprey) [1096] *Lampetra fluviatilis* (river lamprey) [1099] *Alosa fallax* (twaite shad) [1103] *Salmo salar* (salmon) [1106] *Lutra lutra* (otter) [1355] *Phoca vitulina* (harbour seal) [1365]	44.54 km W	44.54 km W
Bray Head SAC	Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] European dry heaths [4030]	45.14 km N	46.99 km N
Rockabill to Dalkey Island SAC	Reefs [1170] *Phocoena phocoena* (harbour porpoise) [1351]	70.39 km N	72.50 km N

Searchable

Site name	Qualifying Interest (QI)	Distance and direction of European Site from the Proposed Development	
		Array Area	Cable Corridor and Working Area
Long Bank SAC	Sandbanks which are slightly covered by sea water all the time [1110]	60.32 km S	57.19 km S
Raven Point Nature Reserve SAC	Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Dunes with *Salix repens ssp. Argentea* (*Salicion arenariae*) [2170] Humid dune slacks [2190]	57.45 km S	52.56 km S
Codling Fault Zone SAC	Submarine structures made by leaking gases [1180]	63.30 km N	66.62 km N
South Dublin Bay SAC	Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] *Salicornia* and other annuals colonizing mud and sand [1310] Embryonic shifting dunes [2110]	63.69 km N	65.53 km N
Howth Head SAC	Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] European dry heaths [4030]	65.75 km N	67.59 km N
North Dublin Bay SAC	Mudflats and sandflats not covered by seawater at low tide [1140] Annual vegetation of drift lines [1210] *Salicornia* and other annuals colonising mud and sand [1310]	66.33 km N	68.18 km N

Searchable

Site name	Qualifying Interest (QI)	Distance and direction of European Site from the Proposed Development	
		Array Area	Cable Corridor and Working Area
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130] Humid dune slacks [2190] *Petalophyllum ralfsii* (petalwort) [1395]		
River Barrow and River Nore SAC	Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Reefs [1170] *Salicornia* and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation [3260] European dry heaths [4030] Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430] Petrifying springs with tufa formation (*Cratoneurion*) [7220] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] Alluvial forests with Alnus *glutinosa* and *Fraxinus excelsior (*Alno-Padion, *Alnion incanae, Salicion albae*) [91E0] *Vertigo moulinsiana* (Desmoulin's whorl snail) [1016] *Margaritifera margaritifera* (freshwater pearl mussel) [1029] *Austropotamobius pallipes* (white-clawed crayfish) [1092] *Petromyzon marinus* (sea lamprey) [1095] *Lampetra planeri* (brook lamprey) [1096]	110.15 km W	109.6 km W

Searchable

Site name	Qualifying Interest (QI)	Distance and direction of European Site from the Proposed Development	
		Array Area	Cable Corridor and Working Area
	Lampetra fluviatilis (river lamprey) [1099] *Alosa fallax* (twaite shad) [1103] *Salmo salar* (salmon) [1106] *Lutra lutra* (otter) [1355] *Trichomanes speciosum* (Killarney fern) [1421] *Margaritifera durrovensis* (Nore pearl mussel) [1990]		
Lambay Island SAC	Reefs [1170] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] *Halichoerus grypus* (grey seal) [1364] *Phoca vitulina* (harbour seal) [1365]	62.87 km N	62.87 km N
Saltee Islands SAC	Mudflats and sandflats not covered by seawater at low tide [1140] Large shallow inlets and bays [1160] Reefs [1170] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Submerged or partially submerged sea caves [8330] *Halichoerus grypus* (Grey Seal) [1364]	93.80 km S	90.70 km S
Lower River Suir SAC	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Mediterranean salt meadows (*Juncetalia maritimi*) [1410] Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] *Hydrophilous* tall herb fringe communities of plains and of the montane to alpine levels [6430] Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, *Alnion incanae, Salicion albae*) [91E0] *Taxus baccata* woods of the British Isles [91J0]	127.04 km SW	126.51 km SW

Searchable

Site name	Qualifying Interest (QI)	Distance and direction of European Site from the Proposed Development	
		Array Area	Cable Corridor and Working Area
	Margaritifera margaritifera (freshwater pearl mussel) [1029] *Austropotamobius pallipes* (white-clawed crayfish) [1092] *Petromyzon marinus* (sea lamprey) [1095] *Lampetra planeri* (brook lamprey) [1096] *Lampetra fluviatilis* (river lamprey) [1099] *Alosa fallax* (twaite shad) [1103] *Salmo salar* (salmon) [1106] *Lutra lutra* (otter) [1355]		
River Boyne and River Blackwater SAC	Alkaline fens [7230] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, *Alnion incanae*, *Salicion albae*) [91E0] *Lampetra fluviatilis* (river lamprey) [1099] *Salmo salar* (salmon) [1106] *Lutra lutra* (otter) [1355]	100.81 km NW	99.86 km NW
Roaringwater Bay and Islands SAC	Large shallow inlets and bays [1160] Reefs [1170] Vegetated sea cliffs of the Atlantic and Baltic coats [1230] European dry heaths [4030] Submerged or partially submerged sea caves [8330] *Phocoena phocoena* (Harbour porpoise) [1351] *Lutra lutra* (Otter) [1355] *Halichoerus grypus* (Grey seal) [1364]	313.81 km SW	310.71 km SW
Blasket Islands SAC	Reefs [1170] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] European dry heaths [4030] Submerged or partially submerged sea caves [8330]	428.45 km SW	425.35 km SW

Searchable

Site name	Qualifying Interest (QI)	Distance and direction of European Site from the Proposed Development	
		Array Area	Cable Corridor and Working Area
	Phocoena phocoena (Harbour porpoise) [1351] *Halichoerus grypus* (Grey seal) [1364]		
Transboundary SACs			
West Wales Marine / Gorllewin Cymru Forol SAC (Wales);	Harbour porpoise (*Phocoena phocoena)* [1351]	93.50 km E	98.58 km E
North Anglesey Marine / Gogledd Môn Forol SAC (Wales);	Harbour porpoise (*Phocoena phocoena)* [1351]	114.17 km NE	119.72 km NE
Pen Llyn a`r Sarnau/ Lleyn Peninsula and the Sarnau SAC (Wales);	Sandbanks which are slightly covered by sea water all the time [1110] Estuaries [1130] Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170] Mudflats and sandflats not covered by seawater at low tide [1140] *Salicornia* and other annuals colonizing mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Submerged or partially submerged sea caves [8330] Grey seal (*Halichoerus grypus)* [1364] Bottlenose dolphin (*Tursiops truncatus)* [1349] Otter (*Lutra lutra)* [1355]	73.32 km E	73.32 km E
Cardigan Bay/ Bae Ceredigion SAC (Wales);	Sandbanks which are slightly covered by sea water all the time [1110] Reefs [1170]	82.73 km E	82.73 km E

Searchable

Site name	Qualifying Interest (QI)	Distance and direction of European Site from the Proposed Development	
		Array Area	Cable Corridor and Working Area
	Submerged or partially submerged sea caves [8330] Sea lamprey (*Petromyzon marinus)* [1095] River lamprey (*Lampetra fluviatilis)* [1099] Bottlenose dolphin (*Tursiops truncatus)* [1349] Grey seal (*Halichoerus grypus)* [1364]		
Pembrokeshire Marine/ Sir Benfro Forol SAC (Wales);	Estuaries [1130] Large shallow inlets and bays [1160] Reefs [1170] Sandbanks which are slightly covered by sea water all the time [1110] Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Submerged or partially submerged sea caves [8330] Grey seal (*Halichoerus grypus)* [1364] Shore dock (*Rumex rupestris)* [1441] Sea lamprey (*Petromyzon marinus)* [1095] River lamprey (*Lampetra fluviatilis)* [1099] Allis shad (*Alosa alosa)* [1102] Twaite shad (*Alosa fallax)* [1103] Otter (*Lutra lutra)* [1355]	129.78 km SE	130.08 km SE
Bristol Channel Approaches / Dynesfeydd Môr Hafren SAC (Wales);	Harbour porpoise (*Phocoena phocoena)* [1351]	214.68 km SE	214.98 km SE
North Channel SAC (NI);	Harbour porpoise (*Phocoena phocoena)* [1351]	194.53 km NE	197.62 km NE

Searchable

Site name	Qualifying Interest (QI)	Distance and direction of European Site from the Proposed Development	
		Array Area	Cable Corridor and Working Area
Nord Bretagne DH (FR);	Harbour porpoise (*Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	487.83 km SE	488.12 km SE
Récifs et landes de la Hague (FR) SAC;	Harbour porpoise (*Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	591.00 km SE	591.29 km SE
Anse de Vauville (FR) SAC;	Harbour porpoise (*Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	591.23 km SE	591.52 km SE
Banc et récifs de Surtainville (FR) SAC;	Harbour porpoise (*Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	597.06 km SE	597.35 km SE
Côte de Granit Rose-Sept Iles (FR);	Harbour porpoise (*Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	509.47 km SE	509.76 km SE
Mers Celtiques – Talus du golfe de Gascogne (FR);	Harbour porpoise (*Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	613.46 km SE	610.35 km SE
Chausey (FR) SAC;	Harbour porpoise (*Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	622.23 km SE	622.52 km SE

Searchable

Site name	Qualifying Interest (QI)	Distance and direction of European Site from the Proposed Development	
		Array Area	Cable Corridor and Working Area
Tregor Goëlo (FR) SAC;	Harbour porpoise (*Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	541.79 km SE	542.08 km SE
Cap d'Erquy-Cap Fréhel (FR) SAC;	Harbour porpoise (*Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	594.22 km SE	594.51 km SE
Baie de Morlaix (FR) SAC;	Harbour porpoise (*Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	505.31 km SE	505.60 km SE
Abers – Côtes des legends (FR) SAC;	Harbour porpoise (*Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	486.66 km SE	486.95 km SE
Baie du Mont Saint-Michel (FR) SAC;	Harbour porpoise (*Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	641.16 km SE	641.45 km SE
Baie de Saint-Brieuc – Est (FR) SAC;	Harbour porpoise (*Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	588.78 km SE	589.07 km SE
Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard (FR) SAC;	Harbour porpoise (*Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	612.40 km SE	612.69 km SE

Searchable

Site name	Qualifying Interest (QI)	Distance and direction of European Site from the Proposed Development	
		Array Area	Cable Corridor and Working Area
Estuaire de la Rance (FR) SAC;	Harbour porpoise (*Phocoena phocoena* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	629.00 km SE	629.29 km SE
Ouessant-Molène (FR) SAC;	Harbour porpoise (*Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	502.42 km SE	502.71 km SE
Côtes de Crozon (FR) SAC;	Harbour porpoise (*Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	531.45 km SE	531.74 km SE
Chaussée de Sein (FR) SAC.	Harbour porpoise (*Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	543.15 km SE	543.43 km SE

Searchable

Table 6.2: SPAs within the precautionary ZoI applied for assessment of effects from the Proposed Development

Site code	Site name	Special Conservation Interest (SCI)	Distance and direction of European Site from the Proposed Development	
			Array Area	Cable Corridor and Working Area
Irish SPAs				
IE004158	River Nanny Estuary and Shore SPA	Oystercatcher (*Haematopus ostralegus*) [A130] Ringed plover (*Charadrius hiaticula*) [A137] Golden plover (*Pluvialis apricaria*) [A140] Knot (*Calidris canutus*) [A143] Sanderling (*Calidris alba*) [A144] Herring gull (*Larus argentatus*) [A184] Wetland and waterbirds [A999]	83.7 km N	82.7 km N
IE004014	Rockabill SPA	Purple sandpiper (*Calidris maritima*) [A148] Roseate tern (*Sterna dougallii*) [A192] Common tern (*Sterna hirundo*) [A193] Arctic tern (*Sterna paradisaea*) [A194]	71.9 km N	71.0 km N
IE004122	Skerries Island SPA	Cormorant (*Phalacrocorax carbo*) [A017] Shag (*Phalacrocorax aristotelis*) [A018] Light-bellied brent goose (*Branta bernicla hrota*) [A046] Purple sandpiper (*Calidris maritima*) [A148] Turnstone (*Arenaria interpres*) [A169] Herring gull (*Larus argentatus*) [A184]	73.0 km N	72.0 km N
IE004015	Rogerstown Estuary SPA	Greylag goose (*Anser anser*) [A043] Light-bellied brent goose (*Branta bernicla hrota*) [A046] Shelduck (*Tadorna tadorna*) [A048] Shoveler (*Anas clypeata*) [A056] Oystercatcher (*Haematopus ostralegus*) [A130]	64.4 km N	63.5 km N

Searchable

Site code	Site name	Special Conservation Interest (SCI)	Distance and direction of European Site from the Proposed Development	
			Array Area	Cable Corridor and Working Area
		Ringed plover (*Charadrius hiaticula*) [A137] Grey plover (*Pluvialis squatarola*) [A141] Knot (*Calidris canutus) [A143]* Dunlin *(Calidris alpina*) [A149] Black-tailed godwit (*Limosa limosa*) [A156] Redshank (*Tringa totanus*) [A162] Wetland and Waterbirds [A999]		
IE004025	Malahide Estuary SPA	Great crested grebe (Podiceps cristatus) [A005] Light-bellied brent goose (*Branta bernicla hrota*) [A046] Shelduck *(Tadorna tadorna*) [A048] Pintail (*Anas acuta*) [A054] Goldeneye (*Bucephala clangu*la) [A067] Red-breasted merganser (*Mergus serrator*) [A069] Oystercatcher (*Haematopus ostralegus*) [A130] Golden plover (*Pluvialis apricaria*) [A140] Grey plover (*Pluvialis squatarola*) [A141] Knot (*Calidris canutus*) [A143] Dunlin (*Calidris alpina*) [A149] Black-tailed godwit (*Limosa limosa*) [A156] Bar-tailed godwit (*Limosa lapponica*) [A157] Redshank (*Tringa totanus*) [A162] Wetland and waterbirds [A999]	59.5 km N	58.6 km N
IE004069	Lambay Island SPA	Fulmar (*Fulmarus glacialis*) [A009] Cormorant (*Phalacrocorax carbo*) [A017] Shag (*Phalacrocorax aristotelis*) [A018] Greylag goose (*Anser anser)* [A043]	62.5 km N	61.6 km N

Searchable

Site code	Site name	Special Conservation Interest (SCI)	Distance and direction of European Site from the Proposed Development	
			Array Area	Cable Corridor and Working Area
		Lesser black-backed gull (*Larus fuscus*) [A183] Herring gull (*Larus argentatus*) [A184] Kittiwake (*Rissa tridactyla*) [A188] Guillemot (*Uria aalge*) [A199] Razorbill (*Alca torda*) [A200] Puffin (*Fratercula arctica*) [A204]		
IE004016	Baldoyle Bay SPA	Light-bellied brent goose (*Branta bernicla hrota*) [A046] Shelduck (*Tadorna tadorna*) [A048] Ringed plover (*Charadrius hiaticula*) [A137] Golden plover (*Pluvialis apricaria*) [A140] Grey plover (*Pluvialis squatarola*) [A141] Bar-tailed godwit (*Limosa lapponica*) [A157] Wetland and waterbirds [A999]	54.1 km N	53.2 km N
IE004117	Ireland's Eye SPA	Cormorant (*Phalacrocorax carbo*) [A017] Herring gull (*Larus argentatus*) [A184] Kittiwake (*Rissa tridactyla*) [A188] Guillemot (*Uria aalge*) [A199] Razorbill (*Alca torda*) [A200]	53.7 km N	52.8 km N
IE004006	North Bull Island SPA	Light-bellied brent goose (*Branta bernicla hrota*) [A046] Shelduck (*Tadorna tadorna*) [A048] Teal (*Anas crecca*) [A052] Pintail (*Anas acuta*) [A054] Shoveler (Anas clypeata) [A056] Oystercatcher (*Haematopus ostralegus*) [A130] Golden plover (*Pluvialis apricaria*) [A140]	49.7 km N	48.7 km N

Screenable

Site code	Site name	Special Conservation Interest (SCI)	Distance and direction of European Site from the Proposed Development	
			Array Area	Cable Corridor and Working Area
		Grey plover (*Pluvialis squatarola*) [A141] Knot (*Calidris canutus*) [A143] Sanderling (*Calidris alba*) [A144] Dunlin (*Calidris alpina*) [A149] Black-tailed godwit (*Limosa limosa*) [A156] Bar-tailed godwit (*Limosa lapponica*) [A157] Curlew (*Numenius arquata*) [A160] Redshank (*Tringa totanus*) [A162] Turnstone (*Arenaria interpres*) [A169] Black-headed gull (*Chroicocephalus ridibundus*) [A179] Wetland and waterbirds [A999]		
IE004113	Howth Head Coast SPA	Kittiwake (*Rissa tridactyla*) [A188]	49.6 km N	48.6 km N
IE004024	South Dublin Bay SPA (also Sandymount Strand/Tolka Estuary Ramsar site)	Light-bellied brent goose (*Branta bernicla hrota*) [A046] Oystercatcher (*Haematopus ostralegus*) [A130] Ringed plover (*Charadrius hiaticula*) [A137] Grey plover (*Pluvialis squatarola*) [A141] Knot (*Calidris canutus*) [A143] Sanderling (*Calidris alba*) [A144] Dunlin (*Calidris alpina*) [A149] Bar-tailed godwit (*Limosa lapponica*) [A157] Redshank (*Tringa totanus*) [A162] Black-headed gull (*Chroicocephalus ridibundus*) [A179] Roseate tern (*Sterna dougallii*) [A192] Common tern (*Sterna hirundo*) [A193]	44.5 km N	43.6 km N

Searchable

Site code	Site name	Special Conservation Interest (SCI)	Distance and direction of European Site from the Proposed Development	
			Array Area	Cable Corridor and Working Area
		Arctic tern (*Sterna paradisaea*) [A194] Wetland and waterbirds [A999]		
IE004172	Dalkey Islands SPA	Roseate tern (*Sterna dougallii*) [A192] Common tern (*Sterna hirundo*) [A193] Arctic tern (*Sterna paradisaea*) [A194]	40.2 km N	39.3 km N
IE004186	The Murrough SPA	Red-throated diver (*Gavia stellata*) [A001] Greylag goose (*Anser anser*) [A043] Light-bellied brent goose (*Branta bernicla hrota*) [A046] Wigeon (*Anas penelope*) [A050] Teal (*Anas crecca*) [A052] Black-headed gull (*Chroicocephalus ridibundus*) [A179] Herring gull (*Larus argentatus*) [A184] Little tern (*Sterna albifrons*) [A195]	7.97 km N	7.03 km N
IE004127	Wicklow Head SPA	Kittiwake (*Rissa tridactyla*) [A188]	6.0 km N	5.2 km N
IE004143	Cahore Marshes SPA	Wigeon (*Anas penelope*) [A050] Golden Plover (*Pluvialis apricaria*) [A140] Lapwing (*Vanellus vanellus*) [A142] Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395] Wetland and Waterbirds [A999]	19.3 km S	18.7 km S

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Site code	Site name	Special Conservation Interest (SCI)	Distance and direction of European Site from the Proposed Development	
			Array Area	Cable Corridor and Working Area
IE004237	Seas off Wexford SPA	Red-throated Diver (*Gavia stellata*) [A001] Fulmar (*Fulmarus glacialis*) [A009] Manx Shearwater (*Puffinus puffinus*) [A013] Gannet (*Morus bassanus*) [A016] Cormorant (*Phalacrocorax carbo*) [A017] Shag (*Phalacrocorax aristotelis*) [A018] Common Scoter (*Melanitta nigra*) [A065] Mediterranean Gull (*Larus melanocephalus*) [A176] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Lesser Black-backed Gull (*Larus fuscus*) [A183] Herring Gull (*Larus argentatus*) [A184] Kittiwake (*Rissa tridactyla*) [A188] Sandwich Tern (*Sterna sandvicensis*) [A191] Roseate Tern (*Sterna dougallii*) [A192] Common Tern (*Sterna hirundo*) [A193] Arctic Tern (*Sterna paradisaea*) [A194] Little Tern (*Sterna albifrons*) [A195] Guillemot (*Uria aalge*) [A199] Razorbill (*Alca torda*) [A200] Puffin (*Fratercula arctica*) [A204]	23 km S	30 km S
IE004019	The Raven SPA	Red-throated diver (*Gavia stellata*) [A001] Cormorant (*Phalacrocorax carbo*) [A017] Common scoter (*Melanitta nigra*) [A065] Grey plover (*Pluvialis squatarola*) [A141] Sanderling (*Calidris alba*) [A144] Greenland white-fronted goose (*Anser albifrons flavirostris*) [A395] Wetland and waterbirds [A999]	34.3 km S	33.8 km S

Screenable

Site code	Site name	Special Conservation Interest (SCI)	Distance and direction of European Site from the Proposed Development	
			Array Area	Cable Corridor and Working Area
IE004076	Wexford Harbour and Slobs SPA	Little grebe (*Tachybaptus ruficollis*) [A004] Great crested grebe (*Podiceps cristatus*) [A005] Cormorant (*Phalacrocorax carbo*) [A017] Grey heron (*Ardea cinerea*) [A028] Bewick's swan (*Cygnus columbianus bewickii*) [A037] Whooper swan (*Cygnus cygnus*) [A038] Light-bellied brent goose (*Branta bernicla hrota*) [A046] Shelduck (*Tadorna tadorna*) [A048] Wigeon (*Anas penelope*) [A050] Teal (*Anas crecca*) [A052] Mallard (*Anas platyrhynchos*) [A053] Pintail (*Anas acuta*) [A054] Scaup (*Aythya marila*) [A062] Goldeneye (*Bucephala clangula*) [A067] Red-breasted merganser (*Mergus serrator*) [A069] Hen harrier (*Circus cyaneus*) [A082] Coot (*Fulica atra*) [A125] Oystercatcher (*Haematopus ostralegus*) [A130] Golden plover (*Pluvialis apricaria*) [A140] Grey plover (*Pluvialis squatarola*) [A141] Lapwing (*Vanellus vanellus*) [A142] Knot (*Calidris canutus*) [A143] Sanderling (*Calidris alba*) [A144] Dunlin (*Calidris alpina*) [A149] Black-tailed godwit (*Limosa limosa*) [A156] Bar-tailed godwit (*Limosa lapponica*) [A157] Curlew (*Numenius arquata*) [A160]	41.6 km SW	41.0 km SW

Searchable

Site code	Site name	Special Conservation Interest (SCI)	Distance and direction of European Site from the Proposed Development	
			Array Area	Cable Corridor and Working Area
		Redshank (*Tringa totanus*) [A162] Black-headed gull (*Chroicocephalus ridibundus*) [A179] Lesser black-backed gull (*Larus fuscus*) [A183] Greenland white-fronted goose (*Anser albifrons flavirostris*) [A395] Wetland and waterbirds [A999]		
004236	North West Irish Sea cSPA	Common Scoter (*Melanitta nigra*) [A065] Red-throated Diver (*Gavia stellata*) [A001] Great Northern Diver (*Gavia immer*) [A003] Fulmar (*Fulmarus glacialis*) [A009] Manx Shearwater (*Puffinus puffinus*) [A013] Shag (*Phalacrocorax aristotelis*) [A018] Cormorant (*Phalacrocorax carbo*) [A017] Little Gull (*Larus minutus*) [A177] Kittiwake (*Rissa tridactyla*) [A188] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Common Gull (*Larus canus*) [A182] Lesser Black-backed Gull (*Larus fuscus*) [A183] Herring Gull (*Larus argentatus*) [A184] Great Black-backed Gull (*Larus marinus*) [A187] Little Tern (*Sterna albifrons*) [A195] Roseate Tern (*Sterna dougallii*) [A192] Common Tern (*Sterna hirundo*) [A193] Arctic Tern (*Sterna paradisaea*) [A194] Puffin (*Fratercula arctica*) [A204] Razorbill (*Alca torda*) [A200] Guillemot (*Uria aalge*) [A199]	46.85 km NE	45.95 km NE

Searchable

Site code	Site name	Special Conservation Interest (SCI)	Distance and direction of European Site from the Proposed Development	
			Array Area	Cable Corridor and Working Area
IE004009	Lady's Island Lake SPA	Gadwall (*Anas strepera*) [A051] Black-headed gull (*Chroicocephalus ridibundus*) [A179] Sandwich tern (*Sterna sandvicensis*) [A191] Roseate tern (*Sterna dougallii*) [A192] Common tern (*Sterna hirundo*) [A193] Arctic tern (*Sterna paradisaea*) [A194] Wetland and Waterbirds [A999]	57.7 km SW	57.1 km SW
IE004092	Tacumshin Lake SPA	Little grebe (*Tachybaptus ruficollis*) [A004] Bewick's swan (*Cygnus columbianus bewickii*) [A037] Whooper swan (*Cygnus cygnus*) [A038] Wigeon (*Anas penelope*) [A050] Gadwall (*Anas strepera*) [A051] Teal (*Anas crecca*) [A052] Pintail (*Anas acuta*) [A054] Shoveler (*Anas clypeata*) [A056] Tufted duck (*Aythya fuligula*) [A061] Coot (*Fulica atra*) [A125] Golden plover (*Pluvialis apricaria*) [A140] Grey plover (*Pluvialis squatarola*) [A141] Lapwing (*Vanellus vanellus*) [A142] Black-tailed godwit (*Limosa limosa*) [A156] Wetland and waterbirds [A999]	61.0 km SW	60.5 km SW
IE004002	Saltee Islands SPA	Fulmar (*Fulmarus glacialis*) [A009] Gannet (*Morus bassanus*) [A016] Cormorant (*Phalacrocorax carbo*) [A017] Shag (*Phalacrocorax aristotelis*) [A018]	70.9 km SW	70.4 km SW

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Site code	Site name	Special Conservation Interest (SCI)	Distance and direction of European Site from the Proposed Development	
			Array Area	Cable Corridor and Working Area
		Lesser black-backed gull (*Larus fuscus*) [A183] Herring gull (*Larus argentatus*) [A184] Kittiwake (*Rissa tridactyla*) [A188] Guillemot (*Uria aalge*) [A199] Razorbill (*Alca torda*) [A200] Puffin (*Fratercula arctica*) [A204]		
IE004020	Ballyteige Burrow SPA	Light-bellied brent goose (*Branta bernicla hrota*) [A046] Shelduck (*Tadorna tadorna*) [A048] Golden plover (*Pluvialis apricaria*) [A140] Grey plover (*Pluvialis squatarola*) [A141] Lapwing (*Vanellus vanellus*) [A142] Black-tailed godwit (*Limosa limosa*) [A156] Bar-tailed godwit (*Limosa lapponica*) [A157] Wetland and waterbirds [A999]	67.3 km SW	66.7 km SW
IE004118	Keeragh Islands SPA	Cormorant (*Phalacrocorax carbo*) [A017]	72.9 km SW	72.3 km SW
IE004033	Bannow Bay SPA	Light-bellied brent goose (*Branta bernicla hrota*) [A046] Shelduck (*Tadorna tadorna*) [A048] Pintail (*Anas acuta*) [A054] Oystercatcher (*Haematopus ostralegus*) [A130] Golden plover (*Pluvialis apricaria*) [A140] Grey plover (*Pluvialis squatarola*) [A141] Lapwing (*Vanellus vanellus*) [A142] Knot (*Calidris canutus*) [A143]	69.0 km SW	68.5 km SW

Searchable

Site code	Site name	Special Conservation Interest (SCI)	Distance and direction of European Site from the Proposed Development	
			Array Area	Cable Corridor and Working Area
		Dunlin (*Calidris alpina)* [A149] Black-tailed godwit (*Limosa limosa*) [A156] Bar-tailed godwit (*Limosa lapponica*) [A157] Curlew (*Numenius arquata*) [A160] Redshank (*Tringa totanus*) [A162] Wetland and Waterbirds [A999]		
IE004080	Boyne Estuary SPA	Shelduck (*Tadorna tadorna*) [A048] Oystercatcher (*Haematopus ostralegus*) [A130] Golden plover (*Pluvialis apricaria*) [A140] Grey plover (*Pluvialis squatarola*) [A141] Lapwing (*Vanellus vanellus*) [A142] Knot (*Calidris canutus*) [A143] Sanderling (*Calidris alba*) [A144] Black-tailed godwit (*Limosa limosa*) [A156] Redshank (*Tringa totanus*) [A162] Turnstone (*Arenaria interpres*) [A169] Little tern (*Sterna albifrons*) [A195] Wetland and Waterbirds [A999]	91.5 km N	90.6 km N
IE004027	Tramore Back Strand SPA	Light-bellied brent goose (*Branta bernicla hrota*) [A046] Golden plover (*Pluvialis apricaria*) [A140] Grey plover (*Pluvialis squatarola*) [A141] Lapwing (*Vanellus vanellus*) [A142] Dunlin (*Calidris alpina*) [A149] Black-tailed godwit (*Limosa limosa*) [A156] Bar-tailed godwit (*Limosa lapponica*) [A157] Curlew (*Numenius arquata*) [A160]	92.2 km SW	91.7 km SW

Searchable

Site code	Site name	Special Conservation Interest (SCI)	Distance and direction of European Site from the Proposed Development	
			Array Area	Cable Corridor and Working Area
		Wetland and Waterbirds [A999]		
UK9013121	Glannau Aberdaron and Ynys Enlli/ Aberdaron Coast and Bardsey Island SPA	Manx shearwater (*Puffinus puffinus)* [A013] Chough (*Pyrrhocorax pyrrhocorax)* [A346] during breeding season Chough (*Pyrrhocorax pyrrhocorax)* [A346] over winter	65.9 km E	65.4 km E
UK9013061	Anglesey Terns / Morwenoliaid Ynys Môn SPA	Roseate tern (*Sterna dougallii)* [A192] Common tern (*Sterna hirundo)* [A193] Arctic tern (*Sterna paradisaea)* [A194] Sandwich tern (*Sterna sandvicensis)* [A191]	82.5 km NE	81.6 km NE
UK9020328	Irish Sea Front SPA	Manx shearwater (*Puffinus puffinus)* [A013]	93.9 km NE	92.9 km NE
UK9020327	Northern Cardigan Bay / Gogledd Bae Ceredigion SPA	Red – throated diver (*Gavia stellate)* [A001]	99.0 km E	98.5 km E
UK9014041	Grassholm SPA	Gannet (*Morus bassanus*) [A016]	107.6 km E	106.9 km E

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6.3 Potential effects

6.3.1.1 The likelihood of significant effects is considered using a source-pathway-receptor model. 'Source' is defined as the individual elements of the proposed works that have the potential to affect the identified ecological receptors both within the European Site and outside of it in accordance with the 'Holohan' judgment (section 3.5). 'Pathway' is defined as the means or route by which a source can affect the ecological receptor. 'Ecological receptor' is defined as the SCI (of SPAs) or QI (of SACs) for which COs have been set for the European Sites under consideration. Each element can exist independently however an effect is created when there is a linkage between the source, pathway and receptor.

6.3.1.2 Any possible direct and indirect effects arising as a result of activities undertaken as part of the Proposed Development are as follows:

- Direct Effects:
  - Loss, deterioration or alteration of Annex I designated habitat QIs habitat in SACs or wetland habitats in SPAs;
  - Aerial noise and/or visual disturbance or displacement of breeding or non-breeding waterbirds inside or outside of SPAs;
  - Pollution, reduction in water quality and habitat deterioration of Annex I habitats in SACs, supporting habitats, or wetland habitats in SPAs;
  - The introduction of underwater noise into the marine environment potentially resulting in mortality, injury, disturbance and/or displacement of populations and/or individuals of Annex II marine mammal or fish species inside or outside of SACs;
  - Collision risk and mortality of birds in the Array Area as a result of operational turbines resulting in a decline in SPA populations; and
  - Collision risk and mortality to marine mammals as a result of increased vessel traffic.
- Indirect Effects:
  - Changed to prey availability, changed to fish and shellfish populations that marine mammal species rely on as prey resources; and
  - Electro Magnetic Field (EMF) transmission along the cable route resulting in disturbance or displacement of populations or individuals of Annex II marine mammal or fish species outside of SACs.

6.3.1.3 These potential effects are considered in turn below as to whether they apply to the Proposed Development for the project alone. Screening in-combination is considered within section 7.3.

6.3.2 Potential Impacts on Annex I habitat

Habitat loss

6.3.2.1 As can be seen from Figure 6.1 and Figure 6.2, the Proposed Development is not located within any European Site and there will therefore be no direct habitat loss from any European Site as a result of the construction and operation of the Proposed Development. Therefore, there will not be any LSE associated with direct habitat loss, even in the absence of mitigation measures.

6.3.2.2 The site is hydrologically and oceanographically connected to a number of European Sites supporting marine and/or coastal habitats and in particular, the proposed landfall is located within 500 m of one European Site at Johnstown South Beach. Consideration is given in the next section as to whether or not the Proposed Development could indirectly affect the qualifying habitats of any of those European Sites.

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Habitat deterioration

6.3.2.3 There is potential for elevated concentrations of suspended sediments, arising as a result of construction and maintenance activities on the seabed, to result in a reduction in water quality and habitat deterioration of qualifying Annex I marine and/or coastal habitats (such as reefs or sand dunes). Elevated concentrations of suspended sediment could also arise from the proposed confirmatory survey activities. However, these activities will be temporary and any suspended sediment resulting from these activities is anticipated to not extend beyond the footprint of the Proposed Development and will dissipate quickly, therefore as no European Sites designated for Annex I habitats overlaps the Array Area or cable corridor, elevated concentrations of suspended sediment as a result of confirmatory surveys has been scoped out of the following assessment.

6.3.2.4 There is potential for elevated concentrations of contaminants, arising as a result of confirmatory surveys, construction, maintenance and decommissioning activities at sea, to result in pollution to qualifying Annex I marine and/or coastal habitats (such as reefs or sand dunes) and subsequent deterioration of those habitats.

Habitat alteration

6.3.2.5 There is potential for longer term changes to coastal processes during the operational phase, due to the presence of windfarm infrastructure on the seabed, resulting in altered hydromorphological conditions of qualifying Annex I marine and/or coastal habitats (such as reefs or sand dunes).

6.3.2.6 Effects of the operational phase on coastal processes, i.e. due to presence of turbine foundations and associated scour protection, including effects on sediment transport processes via interruption of tidal flows, longshore or cross-shore drift patterns or the local wave regime; could potentially affect the COs of any qualifying Annex I marine or coastal habitats (such as reefs or sand dunes).

6.3.3 Potential Impacts on Annex II species

Underwater noise and vibration

6.3.3.1 Marine mammals and fish 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.

6.3.3.2 Auditory injury can occur as either a Permanent Threshold Shift (PTS), where there is no hearing recovery in the animal within the effected frequency range, or as a Temporary Threshold Shift (TTS), where an animal can recover over time. The Irish guidance on assessment of underwater noise (NPWS, 2014) requires that both PTS and TTS are assessed with respect to auditory injury and disturbance. Whilst PTS is considered to be a permanent effect, the most likely response of an animal exposed to noise levels that could induce TTS is to flee the ensonified area. This is therefore also considered to be a behavioural response that overlaps with disturbance ranges, and animals exposed to these noise levels are likely to actively avoid hearing damage by moving away from the area.

6.3.3.3 As noted in section 4, construction of the Proposed Development will require new marine infrastructure to be installed, including turbines, foundations, and subsea cables. The construction phase is estimated to take place over a period of up to four years. Marine engineering construction includes activities producing underwater noise, such as piling and trenching, with associated vessel noise. Underwater noise may also result from geophysical survey activities and UXO clearance which will be required prior to installation of offshore infrastructure as mentioned in section 4.

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Accidental pollution

6.3.3.4 There is the potential for an accidental release of pollutants to occur from vessels and equipment associated with the construction, operational and maintenance and decommissioning phases of the Proposed Development, which may result in adverse effects on marine mammals. Pollutants may include diesel fuel, bentonite (from drilling activities), lubricants, grease and oils, anti-fouling biocides, and grout.

6.3.3.5 In the event of an accidental spill, given the density and distribution of marine mammals in the Marine Mammal Study Area, it is possible that individuals could come into contact with contaminants.

6.3.3.6 Direct impacts include ingestion, inhalation, and absorption. All of which may result in physiological responses with health and long-term survival and/or reproduction consequences, the most serious of which could be damage to the respiratory system (Helm *et al.*, 2015).

6.3.3.7 Indirect impacts include short- and long-term reductions in food availability, disruption to social bonds, reduced reproduction, and/or cumulative effects on individuals, populations, and the ecosystem (Helm *et al.*, 2015).

Electromagnetic fields

6.3.3.8 At operational stage, the inter-array cabling shall operate at 66 kV and the offshore export cable to landfall shall operate at 220 kV. Electricity cables produce electromagnetic fields (EMF), and the transport of electricity through inter-array and export power cables has the potential to emit localised EMF which could potentially affect the sensory mechanisms of some Annex II marine species. The electric and magnetic fields generated increase proportionally to the amount of electricity transmitted. These fields are known to be in the range of detection of electromagnetic sensitive species including migratory fish.

6.3.3.9 These activities carry an inherent risk of potential EMF induced effects upon some qualifying Annex II marine species as a result of transmission of electricity in cables laid on the seabed.

Vessel collision risk

6.3.3.10 Vessel strikes are known to cause injury and mortality in marine mammals although most collisions are poorly documented and reported. The most severe injuries to marine mammals from collision with vessels are where vessels are travelling at over 14 knots and the majority of cases reported are for larger whale species such as humpback whale and fin whale.

6.3.3.11 Construction vessels associated with the Proposed Development will use the existing shipping lanes to transit to/from the Array Area. Therefore, although there will be an increase in vessels associated with the construction phase, this is unlikely to result in a discernible increased risk of collision during transit to/from the Array Area due to the high level of vessel activity using these existing shipping lanes.

6.3.3.12 The risk of collision may be greater within the Array Area itself as there is currently very little traffic moving across the Arklow Bank. However, the key qualifying Annex II species of potential concern are small, fast-moving cetaceans and pinnipeds and in most cases would actively avoid vessels due to elevated noise, as discussed in section 6.3.

6.3.3.13 In addition, most vessels within the Array Area would be either moving slowly or stationary for long periods during the construction phase and therefore the risk of collision is negligible for these. Notwithstanding this, for faster moving motorised vessels transiting the Array Area (e.g. Crew Transfer Vessels), the risk of collision increases.

Changes in prey species distribution and abundance

6.3.3.14 Changes to the prey species' community as a result of construction activities may indirectly affect Annex II marine species due to potential changes in resource availability. This could lead to

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changes in the distribution of qualifying Annex II marine species if there are changes in the distribution and abundance of prey species or reduced foraging success if prey resources are depleted.

6.3.3.15 Potential effects on prey species during construction include the following factors which may affect the distribution, abundance or depletion of prey species and subsequent reduced foraging success of qualifying Annex II marine species:

- Temporary loss/disturbance to the benthic habitats of prey species;
- Temporary increases in suspended sediments and sediment deposition; and
- Elevated levels of underwater noise and vibration during piling and cable laying.

6.3.4 Potential Impacts on Birds Directive species

6.3.4.1 During construction, seabirds and waterbirds may be disturbed by the presence and movement of vessels and construction activities (e.g. piling).

6.3.4.2 Species considered to be at highest risk of disturbance due to windfarm construction are divers and sea ducks, with auks, cormorant and shag estimated to be of moderate sensitivity and terns and gulls at the lower end of the range (Furness *et al.,* 2013).

6.3.4.3 During operation seabirds and waterbirds may avoid the area around turbines, leading to displacement, and also may be disturbed by O&M vessels transiting to and from the windfarm.

6.3.4.4 Avoidance of the turbines can also manifest as barriers to movement for species either passing through the area on migration or resident species commuting between favoured foraging and roosting or breeding sites.

6.3.4.5 For those individuals that do not avoid the turbines and fly at rotor swept heights, there is also a risk of collision with moving rotor blades.

6.3.4.6 Seabirds can be at risk of oiling caused by accidental spills from vessels. However, standard requirements for vessel operation as presented in Annex I Regulations for the Prevention of Pollution by Oil (MARPOL Convention) will be adhered to at all times and therefore this risk is considered to be extremely small and effectively negligible for all species.

6.4 Evaluation

6.4.1.1 The foregoing sections have identified that there is potential for LSE under a range of impact pathways. The European Sites identified in section 6.3.2 must be evaluated with respect to their QIs and SCIs, and in light of the COs set for those sites where an impact pathway exists.

6.4.1.2 The QIs and SCIs of 78 European Sites were considered for the potential for these types of effects to interact with them as a result of the construction O&M and decommissioning of the Proposed Development.

6.5 Coastal habitat and species QIs

6.5.1.1 Of all the SAC QIs considered, many are coastal features which occur in 19 sites in the intertidal or supralittoral zones. These QIs are tabulated in Table 11.3 of Appendix 1: Filtered Tables of European Sites, which lists the QIs and the sites within which they occur.

6.5.1.2 Perennial vegetation of stony banks is vegetation that is found at or above the HWM tide mark on shingle beaches. Sand dune communities are also found above the high tide line. Saltmarsh communities are flooded periodically by the sea and are restricted to the area between neap tide level and high-water spring tide level.

6.5.1.3 The nearest SAC containing these QIs to the Proposed Development is Buckroney-Brittas Dunes and Fen SAC, which is located 369 m north of the landfall and 7.12 km from the Array Area.

Sample

6.5.1.4 Within the sediment budget of nearshore coastal cells, sediments (clay, silt, sand and shingle) are entrained by longshore drift within littoral cells until they are accreted upon the intertidal or supralittoral habitats. Different sizes of sediments are moved in different ways and to different extents by longshore drift depending on the wave, wind and tidal conditions at any location.

6.5.1.5 COs set for these coastal QIs aim to define the favourable conservation condition of the habitats (or species) by setting targets for: area; range; structure and function. This last group (structure and function) can be broken down into a number of attributes, including physical structure, vegetation structure and vegetation composition at a particular site.

6.5.1.6 Whilst implementing the Proposed Development at a distance from any coastal SAC is unlikely to jeopardise the conservation targets for area or range of its habitats, the targets for their sand dune and saltmarsh habitats listed under 'Physical structure: functionality and sediment supply' are to maintain, or where necessary restore, the natural circulation of sediment and organic matter, without any physical obstructions.

6.5.1.7 Engineering interventions are required in the sandbank habitats within the Array Area to install turbine and OSP foundations, but these interventions are greater than 5 km from any shoreline habitats of any SAC. It is unlikely that any localised sediment plumes associated with construction stage activities within the Array Area would have any appreciable effect upon the sediment supply of any coastal site at a distance exceeding 5 km. However, disturbance to seabed sediments will also arise along the route(s) of the offshore export cables, and these interventions will occur as close as 369 m from the Annex I habitats of Buckroney-Brittas Dunes and Fen SAC at the HDD exit point. Sediment plumes arising as a result of the cable trenches or HDD may interrupt natural circulation of sediment and organic matter.

6.5.1.8 Based on professional judgement, and industry best practice, it is considered that during the operational stage, installations may jeopardise the conservation targets for coastal habitats to "maintain, or where necessary restore, the natural circulation of sediment and organic matter, without any physical obstructions". This may be the case for coastal habitats requiring ongoing supply of sandy sediments.

6.5.1.9 Magherabeg Dunes SAC is located 5.85 km from the Array Area. Buckroney-Brittas Dunes and Fen SAC is located 7.12 km from the Array Area. Kilpatrick Sandhills SAC is located 10.54 km from the Array Area. The Murrough Wetlands SAC is located 12.28 km from the Array Area. Cahore Polders and Dunes SAC is located 18.77 km from the Array Area. These sites are located on the coast parallel to the Array Area and all contain Annex I (and priority Annex I) dune habitats. All other European Sites containing coastal habitats are located in excess of 21 km from the Proposed Development.

6.5.1.10 In the absence of computational modelling and further specialist evaluation and analysis demonstrating the predicted extent of sediment plumes arising from construction stage activities then the risk of habitat deterioration as a result of interference with the sediment supply cannot be discounted for Magherabeg Dunes SAC, Buckroney-Brittas Dunes and Fen SAC, Kilpatrick Sandhills SAC, The Murrough Wetlands SAC and Cahore Polders and Dunes SAC at construction stage. Modelling will be utilised to inform the assessments undertaken within the NIS for Stage 2 of the AA process.

6.5.1.11 In the absence of computational modelling and further specialist evaluation and analysis demonstrating the predicted changes in the local sediment budget and long term sediment supply arising from the installed turbine and OSP foundations, then the risk of habitat deterioration as a result of interference with the sediment supply cannot be discounted for Magherabeg Dunes SAC, Buckroney-Brittas Dunes and Fen SAC, Kilpatrick Sandhills SAC, The Murrough Wetlands SAC and Cahore Polders and Dunes SAC at operational stage. When appropriate modelling is available it will be utilised to inform the assessments undertaken within the NIS for Stage 2 of the AA process.

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6.5.1.12 Conversely, LSE upon the COs of the following sites containing Annex I coastal habitats can be discounted at this stage as they are outside of the screening range applied from the Array Area and the Proposed Development and therefore it is considered that there is no pathway for effect:

- Kilmuckridge-Tinnaberna Sandhills SAC;
- Slaney River Valley SAC;
- Bray Head SAC;
- Raven Point Nature Reserve SAC;
- South Dublin Bay SAC;
- Howth Head SAC;
- North Dublin Bay SAC;
- River Barrow and River Nore SAC;
- Lambay Island SAC;
- Saltee Islands SAC;
- Lower River Suir SAC.
- Pembrokeshire Marine SAC/ Sir Benfro Forol SAC;
- Lleyn Peninsula and the Sarnau/ Pen Llyn a`r Sarnau SAC; and
- Murlough SAC;

6.6 Marine habitat QIs

6.6.1.1 Of all the SAC QIs considered, marine features occur in 21 sites at varying distances. These QIs are tabulated in Table 11.4

6.6.1.2 Table 11.4 of Appendix 1: Filtered Tables of European Sites, which lists the QIs and the sites within which they occur.

6.6.1.3 Of these marine QIs, eight are Annex I habitats occurring in 16 SACs. Table 6.3Table 6.3Table 6.3 lists these Annex I habitat QIs within their SACs in ascending order of distance from the Proposed Development. Apart from Reefs in Wicklow Reef SAC (3.61 km), and Sandbanks which are slightly covered by sea water all the time in Blackwater Bank SAC (19.76 km), all of these QIs occur at least 21 km from the Proposed Development.

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Table 6.3: Marine QI habitats potentially susceptible to water quality effects.

Site name	Qualifying interest (QI)	Distance from the Proposed Development (km)
Wicklow Reef SAC	Reefs [1170]	3.61
Blackwater Bank SAC	Sandbanks which are slightly covered by sea water all the time [1110]	19.76
Slaney River Valley SAC	Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140]	44.544
Rockabill to Dalkey Island SAC	Reefs [1170]	70.39
Long Bank SAC	Sandbanks which are slightly covered by sea water all the time [1110]	57.19
Raven Point Nature Reserve SAC	Mudflats and sandflats not covered by seawater at low tide [1140]	52.56
Codling Fault Zone SAC	Submarine structures made by leaking gases [1180]	63.3
South Dublin Bay SAC	Mudflats and sandflats not covered by seawater at low tide [1140]	63.69
North Dublin Bay SAC	Mudflats and sandflats not covered by seawater at low tide [1140]	66.33
River Barrow and River Nore SAC	Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Reefs [1170]	109.60
Lambay Island SAC	Reefs [1170]	62.87
Saltee Islands SAC	Large shallow inlets and bays [1160] Mudflats and sandflats not covered by seawater at low tide [1140] Reefs [1170] Submerged or partially submerged sea caves [8330]	93.80

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Site name	Qualifying interest (QI)	Distance from the Proposed Development (km)
Pen Llyn a`r Sarnau/ Lleyn Peninsula and the Sarnau SAC	Coastal lagoons [1150] Estuaries [1130] Large shallow inlets and bays [1160] Reefs [1170] Sandbanks which are slightly covered by sea water all the time [1110] Mudflats and sandflats not covered by seawater at low tide [1140] Submerged or partially submerged sea caves [8330]	73.32
Cardigan Bay/ Bae Ceredigion SAC	Sandbanks which are slightly covered by sea water all the time [1110] Reefs [1170] Submerged or partially submerged sea caves [8330]	82.73
Pembrokeshire Marine/ Sir Benfro Forol SAC	Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Submerged or partially submerged sea caves [8330]	129.78
The Murrough Wetlands SAC	Mudflats and sandflats not covered by seawater at low tide [1140] Sandbanks which are slightly covered by sea water all the time [1110]	11.15
Lundy Island SAC	Reefs [1170] Sandbanks which are slightly covered by sea water at all time [1110] Submerged or partially submerged sea caves [8330]	205.8 (via marine pathway)
Strangford Lough SAC	Mudflats and sandflats not covered by seawater at low tide [1140] Coastal Lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170]	194.68 (via marine pathway)
Roaringwater Bay and Islands SAC	Large shallow inlets and bays [1160] Reefs [1170] Submerged or partially submerged sea caves [8330]	313.81 (via marine pathway)
Blasket Islands SAC	Reefs [1170] Submerged or partially submerged sea caves [8330]	428.45 (via marine pathway)
Treshnish Isles SAC	Reefs [1170]	437.41 (via marine pathway)

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6.6.1.4 In Wicklow Reef SAC, a current-swept subtidal reef community complex is recorded throughout this site in depths ranging from 6 m on the western margin of the site to up to 40 m at its eastern extreme. The shallower and more level areas of the seabed are composed of cobble and boulder with pockets of gravelly sand and shell. An area of sloping bedrock runs in a northwest-southeast direction in the centre of the site, where the sea floor drops sharply to deeper water. NPWS (2013b) reports that currents of up to 6kn were recorded within this site, with no significant period of slack water.

6.6.1.5 In Blackwater Bank SAC, a sand substrate with *Nephtys cirrose* and *Bathyporeia elegans* community complex is present throughout the site in depths ranging between 0 m and 30 m. The sediment within this complex has high levels of spatial and temporal variability in response to the strong currents and hydrodynamic conditions that occur. *B. elegans* has been recorded in high abundances on the bank itself and in deeper waters in the north eastern and western margins of the site but recorded in low abundances elsewhere, whilst *N. cirrose* has been recorded in low abundances (NPWS, 2013c).

6.6.1.6 On the one hand, conservation targets for area and distribution of reef habitat within Wicklow Reef SAC and sandbank habitat within Blackwater Bank SAC are met when the permanent area (or distribution as the case may be) is stable or increasing, subject to natural processes. The SACs COs supporting documents (NPWS, 2013b; NPWS 2013c), notes that these targets refer to activities or operations that propose to permanently remove reef and sandbank habitat, thus reducing the permanent amount of reef and sandbank habitat (or range over which this habitat occurs as the case may be). Importantly, the targets do not refer to long- or short-term disturbance of the biology of reef and sandbank habitats. On this basis, these conservation targets will not likely be undermined by construction phase sediment plumes.

6.6.1.7 The community structure target to conserve the reef community complex in a natural condition may, however, be undermined by construction phase sediment plumes or pollution events; or affected during the O&M phase by changes in the sediment transport regime once the turbine and OSP foundations have been installed. There is potential for sediment transport effect in Wicklow Reef SAC and Blackwater Bank SAC as these are within 4.52 km and 19.76 km of the Array Area respectively, whereas all other SACs are located at least 21 km away from the Proposed Development.

6.6.1.8 In the absence of computational modelling and further specialist evaluation and analysis demonstrating the predicted extent of sediment plumes arising from construction stage activities then the risks to conserving the reef and sandbank community complex in a natural condition cannot be discounted for Wicklow Reef SAC and Blackwater Bank SAC at the construction stage.

6.6.1.9 The distance between the Proposed Development and the Wicklow Reef and Blackwater Bank SACs would influence the potential for effects on the community structure attribute as a result of pollution incidents, with any pollutants expected to be diluted and dispersed with distance from the source. However, in the absence of mitigation to minimise the risk and severity of such pollution incidents, there is the potential for negative effects on the community structure attribute of the Annex I reef QI of Wicklow Reef SAC, and the Annex I sandbanks which are slightly covered by sea water all the time QI of Blackwater Bank SAC. As such, LSE cannot be excluded at this stage.

6.6.1.10 In the absence of computational modelling and further specialist evaluation and analysis demonstrating the predicted changes in the long-term sediment deposition patterns arising from the installed turbine and OSP foundations, then the risks to conserving the reef and sand substrate with *N. cirrose* and *B. elegans* community complex in a natural condition cannot be discounted for Wicklow Reef SAC and Blackwater Bank SAC during the O&M phase.

6.6.1.11 For those remaining SACs with marine habitats at a distance of 21 km or greater, as listed in Table 8.1, any elevated concentrations of suspended sediments or localised polluting events

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arising during the construction phase or O&M phase as a result of cable repair activities would decrease in the water column around the Array Area or Cable Corridor and Working Area over time and with distance. This would occur across the normal tidal cycle as sediments and concentrations of pollutants disperse and dilute to background levels. It is, therefore, considered that these sites occur beyond the reach of any potential temporary sediment plumes or pollution events (as defined by tidal excursions) to such an extent as to result in habitat deterioration of these marine QIs and conflict with the sites' conservation targets.

6.6.1.12 LSE for marine QIs can be excluded at the screening stage (i.e. in the absence of mitigation measures), for the following European Sites due to a lack of pathway based on the distance to site:

- Cardigan Bay/ Bae Ceredigion SAC;
- Codling Fault Zone SAC;
- Lambay Island SAC;
- Long Bank SAC;
- Murlough SAC;
- North Dublin Bay SAC;
- Pembrokeshire Marine/ Sir Benfro Forol SAC;
- Pen Llyn a`r Sarnau/ Lleyn Peninsula and the Sarnau SAC;
- Raven Point Nature Reserve SAC;
- River Barrow and River Nore SAC;
- Rockabill to Dalkey Island SAC;
- Saltee Islands SAC;
- Slaney River Valley SAC;
- South Dublin Bay SAC;
- Lundy Island SAC;
- Strangford Lough SAC;
- Roaringwater Bay and Islands SAC;
- Blasket Islands SAC; and
- Treshnish Isles SAC.

6.7 Waders and wildfowl populations of intertidal SPAs

6.7.1.1 These overwintering visitors to Ireland's wetland SPA sites forage and roost in shallow mudflats and estuaries. They do not feed over the open sea and do not use the Array Area to overwinter. The movement of these migratory waders and wildfowl is characterised by long distance flights, which occur as a series of flights between discrete wetlands or 'staging areas'. The majority of these movements occur across broad fronts with radar studies showing that waders will migrate at altitudes of 500-4,000 m (e.g. van de Kam *et al.,* 2004). Only when migrating waders encounter unfavourable weather will birds descend to lower heights following landscape QIs such as coastlines until they reach suitable staging areas.

6.7.1.2 During the spring and autumn migration periods, the route taken by migrating individuals may change due to the presence of wind turbines within the Array Area. Although migrating birds may have to increase their energy expenditure to circumvent the Array Area at a time when their energy budgets are typically restricted, this effect is likely to be small for one-off avoidances. Masden *et al.,* (2010, 2012) and Speakman *et al.,* (2009) calculated that the costs of one-off avoidances during migration were small, accounting for less than 2% of available fat reserves.

6.7.1.3 COs for overwintering birds in intertidal wetland SPAs relate to (1) population trends with the conservation target being that the long-term population trend remains stable or increasing; and (2) the range, timing and intensity of use of areas of the SPA with the conservation target being

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no significant decrease in the range, timing or intensity of use of areas of the SPA by the relevant waterbird, other than that occurring from natural patterns of variation.

6.7.1.4 Therefore, the potential effect on birds that only migrate through the Array Area (including seabirds, waders and waterbirds on passage) and do not use the marine waters of the Array Area can be considered negligible and not at all likely to affect the conservation targets set for these SCI species in their estuarine wetland SPAs above a negligible level. LSE will not occur.

6.7.1.5 Only the potential for accidental pollution to cause deterioration of the water quality of these estuarine wetlands could potentially affect the wader and wildfowl populations of intertidal SPAs, and this is discussed below.

6.8 SPA wetland habitats SCIs

6.8.1.1 Wetland and Waterbirds [A999] is a QI of five of the SPAs screened within 50 km of the Proposed Development. The CO for these wetlands is to maintain the favourable conservation condition of the wetland habitat in the respective SPA sites as a resource for the regularly occurring migratory waterbirds that utilise it. Table 6.4 lists the SPAs which have the 'Wetland and Waterbirds [A999]' as a SCI in ascending order of distance from the Proposed Development.

Table 6.46: SPAs with wetland habitat potentially susceptible to water quality effects

Site name	Distance from the Proposed Development (km)
Cahore Marshes SPA	19.32
The Raven SPA	34.33
Wexford Harbour and Slobs SPA	40.97
South Dublin Bay and River Tolka Estuary SPA	43.54
North Bull Island SPA	48.73

6.8.1.2 In relation to the CO for wetland habitat, NPWS CO supporting documents for SPAs note that for the wetland to be in favourable condition, the permanent area occupied by the wetland habitat should be stable and not significantly less than the target area cited for each SPA, other than that occurring from natural patterns of variation.

6.8.1.3 The wetland habitats can be categorised into three broad types: subtidal; intertidal and supratidal. Over time and through natural variation, these sub-components of the overall wetland complex may vary due to factors such as changing rates of sedimentation, erosion etc. Many waterbird species will use more than one of the habitat types for different reasons throughout the tidal cycle.

6.8.1.4 Whilst the maintenance of the 'quality' of wetland habitat lies outside the scope of the wetland habitat objective (as stated by NPWS in site specific CO documents for wetland SPA sites), for the species of SCI the scope of the population trend and distribution objective covers the need to maintain, or improve where appropriate, the different properties of the wetland habitats contained within the SPA.

6.8.1.5 On this basis, wetlands of SPA sites should also be considered under the theme of water quality and habitat deterioration effects.

6.8.1.6 Table 6.4 notes that all SPAs designated for their wetlands are located at least 10 km away from the Proposed Development. As such, there will be no reduction in the permanent area occupied by the wetland habitat of any of the SPAs considered here. Furthermore, applying the analysis in paragraph 6.6.1.11 in relation to elevated concentrations of suspended sediments and pollutants

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diluting to background levels over time across tidal cycles and with distance, deterioration of the water quality of any of these wetland habitats will not occur. Any likely effect is no greater than negligible significance.

6.8.1.7 LSE can be excluded at the screening stage for the CO's of SPAs with wetland habitat SCIs. That is the case in the absence of mitigation measures for all of the European Sites listed in Table 6.4.

6.9 Marine species QIs

6.9.1.1 Of the marine SAC QIs listed in Appendix 1: Filtered Tables of European Sites, nine are Annex II species occurring in 22 SACs. Table 6.5 lists these Annex II species QIs within their SACs in ascending order of distance from the Proposed Development.

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Table 6.5: Marine QI species potentially susceptible to the effects resulting from the Proposed Development

Site name	Qualifying Interest (QI)	Distance from the Proposed Development (km)	
		Array Area	Cable Corridor and Working Area
Slaney River Valley SAC (IR)	Sea lamprey *Petromyzon marinus* River lamprey *Lampetra fluviatilis* Twaite shad *Alosa fallax* Atlantic salmon *Salmo salar* Harbour seal *Phoca vitulina*	44.54	44.54
Rockabill to Dalkey Island SAC (IR)	Harbour porpoise *(Phocoena phocoena)*	70.39	72.5
Blackwater Bank SAC (IR)	Harbour porpoise *(Phocoena phocoena)*	19.76	19.76
West Wales Marine SAC (Wales)	*Harbour porpoise (Phocoena phocoena)*	93.5	98.58
River Barrow and River Nore SAC (IR)	Sea lamprey (*Petromyzon marinus)* River lamprey (*Lampetra fluviatilis*) Twaite shad (*Alosa fallax)* Atlantic salmon (*Salmo salar)*	110.15	109.6
North Anglesey Marine SAC (Wales)	*Harbour porpoise (Phocoena phocoena)*	114.17	119.72
Lambay Island SAC (IR)	Grey seal (*Halichoerus grypus)* Harbour seal (*Phoca vitulina)* Harbour porpoise *(Phocoena phocoena)*	62.87	62.87
Saltee Islands SAC (IR)	Grey seal (*Halichoerus grypus)*	93.8	90.7

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Site name	Qualifying Interest (QI)	Distance from the Proposed Development (km)	
		Array Area	Cable Corridor and Working Area
Codling Fault Zone SAC (IR)	Harbour porpoise *(Phocoena phocoena)*	63.31	66.62
Pen Llyn a`r Sarnau/ Lleyn Peninsula and the Sarnau SAC (Wales)	Grey seal (*Halichoerus grypus)* Bottlenose dolphin (*Tursiops truncates)*	73.32	73.32
Carnsore Point SAC (IR)	Harbour porpoise *(Phocoena phocoena)*	73.83	70.7
Lower River Suir SAC (IR)	Sea lamprey (*Petromyzon marinus)* River lamprey (*Lampetra fluviatilis)* Twaite shad (Alosa *fallax)* Atlantic salmon (*Salmo salar)*	127.04	126.51
Cardigan Bay SAC (Wales)	Bottlenose dolphin (*Tursiops truncates)* Grey seal (*Halichoerus grypus*) Sea lamprey (*Petromyzon marinus)* River lamprey (*Lampetra fluviatilis)*	82.73	82.73
River Boyne and River Blackwater SAC (IR)	Atlantic salmon (*Salmo salar)* River lamprey (*Lampetra fluviatilis)*	100.81	99.86
Hook Head SAC (IR)	Harbour porpoise *(Phocoena phocoena)* Bottlenose dolphin (*Tursiops truncates)*	113.08	109.95
Bristol Channel Approaches/	Harbour porpoise *(Phocoena phocoena)*	214.68	214.98

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Site name	Qualifying Interest (QI)	Distance from the Proposed Development (km)	
		Array Area	Cable Corridor and Working Area
Dynesfeydd Môr Hafren SAC (Wales)			
North Channel SAC (NI)	Harbour porpoise *(Phocoena phocoena)*	194.53	197.62
Roaringwater Bay and Islands SAC (IR)	Harbour porpoise *(Phocoena phocoena)* Grey seal *(Halichoerus grypus)*	313.81	310.71
Blasket Islands SAC (IR)	Harbour porpoise *(Phocoena phocoena)* Grey seal *(Halichoerus grypus)*	428.45	425.35
Kenmare River SAC (IR)	Harbour porpoise *(Phocoena phocoena)*	374.57	371.44
Nord Bretagne DH (FR)	Harbour porpoise *(Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	487.83	488.12
Tregor Goëlo (FR) SAC	Harbour porpoise *(Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	541.79	542.08

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Site name	Qualifying Interest (QI)	Distance from the Proposed Development (km)	
		Array Area	Cable Corridor and Working Area
Récifs et landes de la Hague (FR) SAC	Harbour porpoise *(Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	591	591.29
Chausey (FR) SAC	Harbour porpoise *(Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	622.23	622.52
Anse de Vauville (FR) SAC	Harbour porpoise *(Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	591.23	591.52
Mers Celtiques – Talus du golfe de Gascogne (FR) SAC	Harbour porpoise *(Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	613.46	610.35

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Site name	Qualifying Interest (QI)	Distance from the Proposed Development (km)	
		Array Area	Cable Corridor and Working Area
Banc et récifs de Surtainville (FR) SAC	Harbour porpoise *(Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	597.06	597.35
Baie de Morlaix (FR) SAC	Harbour porpoise *(Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	505.31	505.6
Abers – Côtes des legends (FR) SAC	Harbour porpoise *(Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	486.66	486.95
Ouessant-Molène (FR) SAC	Harbour porpoise *(Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	502.42	502.71

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Site name	Qualifying Interest (QI)	Distance from the Proposed Development (km)	
		Array Area	Cable Corridor and Working Area
Belgica Mound Province SAC (IR)	Harbour porpoise *(Phocoena phocoena)* Bottlenose dolphin (*Tursiops truncates)*	468.93	465.83
Cap d'Erquy-Cap Fréhel (FR) SAC	Harbour porpoise *(Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	594.22	594.51
Côte de Granit rose-Sept-Iles (FR) SAC	Harbour porpoise *(Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	509.47	509.76
Côtes de Crozon (FR) SAC	Harbour porpoise *(Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	531.45	531.74
Baie de Saint-Brieuc – Est (FR) SAC	Harbour porpoise *(Phocoena phocoena)*	588.78	589.07

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Site name	Qualifying Interest (QI)	Distance from the Proposed Development (km)	
		Array Area	Cable Corridor and Working Area
	(the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)		
Chaussée de Sein (FR) SAC	Harbour porpoise *(Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	543.15	543.43
Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard (FR) SAC	Harbour porpoise *(Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	612.4	612.69
Baie du Mont Saint-Michel (FR) SAC	Harbour porpoise *(Phocoena phocoena)* (the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)	641.16	641.45
Estuaire de la Rance (FR) SAC	Harbour porpoise *(Phocoena phocoena)*	629	629.29

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Site name	Qualifying Interest (QI)	Distance from the Proposed Development (km)	
		Array Area	Cable Corridor and Working Area
	(the distance to site and management units applied means that no other features are screened in for these sites due to lack of pathway)		
Bunduff Lough and Machair / Trawalua / Mullaghmore SAC (IR)	Harbour porpoise *(Phocoena phocoena)*	535.89	540.01
Inishmore Island SAC (IR)	Harbour porpoise *(Phocoena phocoena)*	552.4	549.28
Kilkieran Bay and Islands SAC (IR)	Harbour porpoise *(Phocoena phocoena)*	565.87	562.75
West Connacht Coast SAC (IR)	Harbour porpoise *(Phocoena phocoena)*	608.58	605.46

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6.9.1.2 Given that mobile marine QI species have the capacity to travel widely within their range, unlike habitats, effects can occur at much greater distances. Blackwater Bank SAC is designated for harbour porpoise, it is the closest SAC with marine QI species and is located 19.76 km south of the Proposed Development.

6.9.1.3 Four species of fish (sea lamprey, river lamprey, twaite shad and Atlantic salmon) and harbour seal are QIs of Slaney River Valley SAC. The closest route through water is via Wexford Harbour, 44.54 km to the southeast.

6.9.1.4 West Wales Marine SAC and North Anglesey Marine SAC are designated for harbour porpoise, located 93.50 km east of and 114.17 km northeast of the Proposed Development, respectively. The Bristol Channel Approaches SAC and the North Channel SAC are also designated for harbour porpoise, which are much further away, located 214.68 km south and 194.53 km north of the Proposed Development, respectively. For the purposes of a population level assessment, these populations of harbour porpoise are all within the Celtic and Irish Seas Management Unit.

6.9.1.5 Lambay Island SAC, Saltee Islands SAC, Lleyn Peninsula and the Sarnau SAC and Cardigan Bay SAC are designated for grey seal. Lambay Island is located 62.87 km to the north of the Proposed Development and is also designated for its harbour seal populations. The Saltee Islands SAC is located 90.7 km to the south of the Proposed Development. The Lleyn Peninsula and the Sarnau SAC is located 73.32 km east of the Proposed Development and Cardigan Bay SAC 82.73 km to the east of the Proposed Development.

6.9.1.6 Lleyn Peninsula and the Sarnau SAC, and Cardigan Bay SAC are also designated for bottlenose dolphin.

6.9.1.7 Roaringwater Bay and Islands SAC is located 310.71 km away from the Proposed Development and designated for harbour porpoise and grey seal. The Blasket Islands SAC is also designated for harbour porpoise and grey seal, located 425.35 km to the southwest of the Proposed Development.

6.9.1.8 The River Boyne and River Blackwater SAC is designated inter alia for its population of Atlantic salmon and river lamprey. It is located 99.86 km north of the Proposed Development.

6.9.1.9 The Lower River Suir SAC and the River Barrow and River Nore SAC are both also designated for sea lamprey, river lamprey, twaite shad and Atlantic salmon and are located 125 km along a hydrological pathway from the Proposed Development to the confluence of the Rivers Suir and Barrow where they meet at Passage East.

6.9.1.10 Construction of the Proposed Development will require new marine infrastructure to be installed, including turbines, foundations and subsea cables. The construction phase is estimated to take place over a period of up to four years. Marine engineering construction includes activities producing underwater noise, such as marine piling and trenching, with associated vessel noise, as outlined in section 6.3.3.

6.9.1.11 During the O&M phase, the offshore inter-array cabling shall operate at 66 kV and the offshore export cables to landfall shall operate at 220 kV. Electricity cables produce electromagnetic fields (EMF), and the transport of electricity through inter-array and export power cables has the potential to emit a localised EMF which could potentially affect the sensory mechanisms of some benthic species. The electric and magnetic fields generated increase proportionally to the amount of electricity transmitted. These fields are known to be in the range of detection of electromagnetic sensitive species including migratory fish.

6.9.1.12 These activities carry an inherent risk of potential noise or EMF induced effects upon some marine species as a result of underwater acoustic energy being released into the marine environment and transmission of electricity in cables laid or buried in the seabed.

6.9.1.13 Mobile marine species can range widely from their core areas for the purposes of foraging or migration, for example. As such while the potential for LSE at a population level is lower if not

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non-existent (i.e. underwater noise modelling predicts noise will not propagate into the SAC) within the boundaries of the SAC, there is the potential for individuals of the populations of Annex II marine QI species to travel nearer to or within the Array Area and be subject to underwater noise relating to the Project Development.

6.9.1.14 In such cases, individuals could suffer physical injury, hearing damage, disturbance or displacement by underwater noise levels generated by the construction or operation of the Proposed Development. Similarly, LSE could arise as a result of changes in prey species distribution and abundance as a result of underwater noise, or as a result of increased collision risk with vessels at construction or operational phases. In applying the precautionary principle, there is a possibility that individuals of a species could be significantly affected, even if only temporarily, by the Proposed Development.

6.9.1.15 As these risks cannot be discounted without further specialist evaluation and analysis and possibly the application of measures intended to avoid or reduce the harmful effects of the Proposed Development, then it follows that the risk of underwater noise or electromagnetic fields introduced into the marine environment, changes in prey species distribution and abundance, accidental pollution and/or collision with vessels could provide a pathway of effect leading to physical injury, disturbance or barriers to movement of the relevant Annex II marine QI species such as harbour seal, grey seal, harbour porpoise, bottlenose dolphin, sea lamprey, river lamprey, twaite shad or Atlantic salmon.

6.9.1.16 It should be noted that Cardigan Bay SAC is also designated for river lamprey. The migratory fish QIs of this European Site has been listed in Table 11.4 for completeness (as this site has been brought forward for its marine mammal QIs), however, at a distance of 82.73 km from the Proposed Development this European Site lies out with the ZoI outlined in section 6.2 for migratory fish QIs. Connectivity between the Proposed Development and the movement of individuals from these European Sites is deemed highly unlikely. On this basis, there is no pathway to effect and LSE can be excluded at the screening stage for the migratory fish QIs (only) of the Cardigan Bay SAC.

6.9.1.17 LSE upon the following European Sites cannot be excluded at the screening stage:

- Blackwater Bank SAC;
- Belgica Mound Province SAC;
- Bristol Channel Approaches/ Dynesfeydd Môr Hafren SAC;
- Bunduff Lough and Machair / Trawalua / Mullahmore SAC;
- Cardigan Bay/ Bae Ceredigion SAC (marine mammal QIs only);
- Carnsore Point SAC;
- Codling Fault Zone SAC;
- Hook Head SAC;
- Inishmore Island SAC;
- Kenmare River SAC;
- Kilkieran Bay and Island SAC;
- Lambay Island SAC;
- Lower River Suir SAC;
- North Anglesey Marine/ Gogledd Môn Forol SAC;
- North Channel SAC;
- Lleyn Peninsula and the Sarnau/ Pen Llyn a`r Sarnau SAC;
- River Barrow and River Nore SAC;
- River Boyne and River Blackwater SAC;
- Rockabill to Dalkey Island SAC;
- Saltee Islands SAC;

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- Slaney River Valley SAC;
- West Connacht Coast SAC;
- West Wales Marine/ Gorllewin Cymru Forol SAC;
- Roaringwater Bay and Islands SAC;
- Blasket Islands SAC
- Nord Bretagne DH;
- Récifs et landes de la Hague SAC ;
- Anse de Vauville SAC ;
- Banc et récifs de Surtainville SAC ;
- Côte de Granit Rose-Sept Iles ;
- Mers Celtiques – Talus du golfe de Gascogne ;
- Chausey SAC;
- Tregor Goëlo SAC;
- Côte de Granit rose-Sept-Iles SAC ;
- Mers Celtiques – Talus du golfe de Gascogne SAC ;
- Cap d'Erquy-Cap Fréhel SAC ;
- Baie de Morlaix SAC ;
- Abers – Côtes des legends SAC ;
- Baie du Mont Saint-Michel SAC ;
- Baie de Saint-Brieuc – Est SAC ;
- Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard SAC ;
- Estuaire de la Rance SAC ;
- Ouessant-Molène SAC;
- Côtes de Crozon SAC ; and
- Chaussée de Sein SAC.

6.10 Seabird populations of SPAs

6.10.1.0 Section 66.3.4 notes that seabird populations are at risk from the construction, and operation and/or maintenance of the Proposed Development. Eighteen species of breeding seabird SCIs are a feature of 23 SPAs within 125 km of the Proposed Development. Table 6.6Table 6.6: lists the SPAs which have a breeding seabird population as a SCI in ascending order of distance from the Proposed Development.

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Table 6.6: SPAs designated for breeding seabird populations for which there may be a pathway of effect with the Proposed Development

Site name	SCI	Distance from the Proposed Development (km)	
		Array Area	Cable Corridor and Working Area
Wicklow Head SPA	Kittiwake (*Rissa tridactyla*) [A188]	5.99	5.27
The Murrough SPA	Little tern (*Sterna albifrons*) [A195]	7.97	7.05
Seas off Wexford cSPA	Red-throated Diver (*Gavia stellata*) [A001] Fulmar (*Fulmarus glacialis*) [A009] Manx Shearwater (*Puffinus puffinus*) [A013] Gannet (*Morus bassanus*) [A016] Cormorant (*Phalacrocorax carbo*) [A017] Shag (*Phalacrocorax aristotelis*) [A018] Common Scoter (*Melanitta nigra*) [A065] Mediterranean Gull (*Larus melanocephalus*) [A176] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Lesser Black-backed Gull (*Larus fuscus*) [A183] Herring Gull (*Larus argentatus*) [A184] Kittiwake (*Rissa tridactyla*) [A188] Sandwich Tern (*Sterna sandvicensis*) [A191] Roseate Tern (*Sterna dougallii*) [A192] Common Tern (*Sterna hirundo*) [A193] Arctic Tern (*Sterna paradisaea*) [A194] Little Tern (*Sterna albifrons*) [A195] Guillemot (*Uria aalge*) [A199] Razorbill (*Alca torda*) [A200] Puffin (*Fratercula arctica*) [A204]	15.51	14.93
The Raven SPA	Little tern (*Sterna albifrons*) [A195]	34.33	33.75
Dalkey Islands SPA	Arctic tern (*Sterna paradisaea)* [A194]	40.22	39.29

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Site name	SCI	Distance from the Proposed Development (km)	
		Array Area	Cable Corridor and Working Area
	Common tern (*Sterna hirundo*) [A193] Roseate tern (*Sterna dougallii*) [A192]		
Wexford Harbour and Slobs SPA	Cormorant (*Phalacrocorax carbo*) [A017] Lesser black-backed gull (*Larus fuscus*) [A183] Little tern (*Sterna albifrons*) [A195]	41.56	40.97
South Dublin Bay and River Tolka Estuary SPA	Arctic tern (*Sterna paradisaea*) [A194] Black-headed gull (*Chroicocephalus ridibundus*) [A179] Common tern (*Sterna hirundo*) [A193] Roseate tern (*Sterna dougallii*) [A192]	44.45	43.54
Howth Head Coast SPA	Kittiwake (*Rissa tridactyla*) [A188]	49.55	48.63
Ireland's Eye SPA	Cormorant (*Phalacrocorax carbo*) [A017] Guillemot (*Uria aalge*) [A199] Herring gull (*Larus argentatus*) [A184] Kittiwake (*Rissa tridactyla*) [A188] Razorbill (*Alca torda*) [A200]	53.74	52.81
Lady's Island Lake SPA	Arctic tern (*Sterna paradisaea*) [A194] Black-headed gull (*Chroicocephalus ridibundus*) [A179] Common tern (*Sterna hirundo*) [A193] Roseate tern (*Sterna dougallii*) [A192] Sandwich tern (*Sterna sandvicensis*) [A191]	57.65	57.08
North West Irish Sea cSPA	Common Scoter (*Melanitta nigra*) [A065] Red-throated Diver (*Gavia stellata*) [A001] Great Northern Diver (*Gavia immer*) [A003] Fulmar (*Fulmarus glacialis*) [A009]	46.9	46.0

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Site name	SCI	Distance from the Proposed Development (km)	
		Array Area	Cable Corridor and Working Area
	Manx Shearwater (*Puffinus puffinus*) [A013] Shag (*Phalacrocorax aristotelis*) [A018] Cormorant (*Phalacrocorax carbo*) [A017] Little Gull (*Larus minutus*) [A177] Kittiwake (*Rissa tridactyla*) [A188] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Common Gull (*Larus canus*) [A182] Lesser Black-backed Gull (*Larus fuscus*) [A183] Herring Gull (*Larus argentatus*) [A184] Great Black-backed Gull (*Larus marinus*) [A187] Little Tern (*Sterna albifrons*) [A195] Roseate Tern (*Sterna dougallii*) [A192] Common Tern (*Sterna hirundo*) [A193] Arctic Tern (*Sterna paradisaea*) [A194] Puffin (*Fratercula arctica*) [A204] Razorbill (*Alca torda*) [A200] Guillemot (*Uria aalge*) [A199]		
Lambay Island SPA	Cormorant (*Phalacrocorax carbo*) [A017] Fulmar (*Fulmarus glacialis*) [A009] Guillemot (*Uria aalge*) [A199] Herring gull (*Larus argentatus*) [A184] Kittiwake (*Rissa tridactyla*) [A188] Lesser black-backed gull (*Larus fuscus*) [A183] Puffin (*Fratercula arctica*) [A204] Razorbill (*Alca torda*) [A200] Shag (*Phalacrocorax aristotelis*) [A018]	62.5	61.58

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Site name	SCI	Distance from the Proposed Development (km)	
		Array Area	Cable Corridor and Working Area
Aberdaron Coast and Bardsey Island / Glannau Aberdaron and Ynys Enlli SPA	Manx shearwater *Puffinus puffinus* [A013]	65.9	65.4
Saltee Islands SPA	Cormorant (*Phalacrocorax carbo*) [A017] Fulmar (*Fulmarus glacialis*) [A009] Gannet (*Morus bassanus*) [A016] Guillemot (*Uria aalge*) [A199] Herring gull (*Larus argentatus*) [A184] Kittiwake (*Rissa tridactyla*) [A188] Lesser black-backed gull (*Larus fuscus*) [A183] Puffin (*Fratercula arctica*) [A204] Razorbill (*Alca torda*) [A200] Shag (*Phalacrocorax aristotelis*) [A018]	70.93	70.35
Rockabill SPA	Arctic tern (*Sterna paradisaea*) [A194] Common tern (*Sterna hirundo*) [A193] Roseate tern (*Sterna dougallii*) [A192]	71.89	70.98
Keeragh Islands SPA	Cormorant (*Phalacrocorax carbo*) [A017]	72.87	72.29
Skerries Island SPA	Cormorant (*Phalacrocorax carbo*) [A017] Herring gull (*Larus argentatus*) [A184] Shag (*Phalacrocorax aristotelis*) [A018]	72.95	72.03
Anglesey Terns / Morwenoliaid Ynys Môn SPA	Arctic tern *(Sterna paradisaea)* [A194] Common tern (*Sterna hirundo*) [A193] Roseate tern (*Sterna dougallii*) [A192] Sandwich tern (*Sterna sandvicensis*) [A191]	82.41	81.53

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Site name	SCI	Distance from the Proposed Development (km)	
		Array Area	Cable Corridor and Working Area
River Nanny Estuary and Shore SPA	Herring gull (*Larus argentatus*) [A184]	83.65	82.75
Boyne Estuary SPA	Little tern (*Sterna albifrons*) [A195]	91.49	90.57
Irish Sea Front SPA	Manx shearwater (*Puffinus puffinus)* [A013]	93.86	92.86
North Cardigan Bay SPA	Red-throated diver (*Gavia stellata*) [A001]	99.0	98.48
Grassholm SPA	Gannet (*Morus bassanus*) [A016]	107.57	106.9

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6.10.2 Aberdaron Coast and Bardsey Island SPA

6.10.2.1 Aberdaron Coast and Bardsey Island SPA is designated for breeding Manx shearwater (and breeding chough, however as this is a terrestrial species there is no pathway for this species to be at risk of a likely significant effect (LSE), so it is not discussed here). The SPA is located 65.4 km from the Proposed Development. Manx shearwaters cover large distances whilst foraging (mean maximum 1,346 km, Woodward *et al.,* 2019) and migrating, however this species flies low to the sea surface and consequently there is no risk of collisions with the Proposed Development during the O&M phase. There is no prospect of noise or visual stimuli resulting in disturbance at this distance from the SPA.

6.10.2.2 Given the extensive foraging range of this species and the comparatively small size of the Proposed Development, the risk of either displacement or barrier effects is considered to be very small. Therefore, due to the very low risk of collisions, displacement or barrier effects affecting this population, LSE upon these breeding SCI species can be excluded at the screening stage. This is the case in the absence of mitigation measures.

6.10.3 Anglesey Terns SPA

6.10.3.1 Anglesey Terns SPA is designated as a marine extension to the adjacent Cemlyn Bay and The Skerries SPA which is designated for breeding terns. The SPA is located 81.53 km from the Proposed Development. This is beyond the maximum foraging ranges of the designated tern species (Sandwich tern: 80 km, roseate tern: 24 km, common tern: 30 km, Arctic tern: 46 km; Woodward *et al.,* 2019). Therefore, there is no risk that breeding birds from these SPA populations will be present regularly in the Array Area during the breeding season. All four species are migratory, arriving from the south in spring and returning in autumn.

6.10.3.2 There is a small risk that individuals from these populations may pass through the Array Area on migration, however given the distance between the SPA and the Proposed Development this likelihood is considered to be very small. Furthermore, these tern species tend to migrate close to the coast when that is an option (Wernham *et al.,* 2002), and so it is also likely that only a very small proportion of the population from this SPA would pass through the Array Area because of their habitat preference for foraging during migration in sheltered coastal waters. Therefore, due to the very low risk of collisions (and only whilst on migration), displacement or barrier effects affecting these populations, LSE upon these breeding SCI species can be excluded at the screening stage. This is the case in the absence of mitigation measures.

6.10.4 Boyne Estuary SPA

6.10.4.1 Boyne Estuary SPA is designated primarily for overwintering waders and wildfowl species, which are not considered to be at risk of the potential effects of the Proposed Development (section 5). Breeding little tern is also a QI, however the SPA is more than 90 km from the Proposed Development while the maximum little tern foraging range is 5 km (Woodward *et al.,* 2019). Therefore, there is no risk that individuals from this population will be present regularly in the Array Area during the breeding season.

6.10.4.2 Little terns are migratory, arriving from the south in spring and returning in autumn. There is a small risk that individuals from this population may pass through the Array Area on migration, however no little terns were recorded in the Array Area or the wider survey area during surveys in 2018-2020, and little terns are known to favour coastal habitat so avoid offshore waters unless there is no choice on their migration route (Wernham *et al.,* 2002). Therefore, due to the very low risk of collisions (and these only whilst on migration), displacement or barrier effects affecting this population, LSE upon this breeding SCI species can be excluded at the screening stage. That is the case in the absence of mitigation measures.

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6.10.5 Dalkey Islands SPA

6.10.5.1 Dalkey Islands SPA is designated for breeding roseate, common and Arctic terns. The SPA is located 39.29 km from the Proposed Development. This is beyond the maximum foraging ranges of these tern species (max is 26 km for Arctic tern, Woodward *et al.,* 2019). Therefore, there is no risk that birds from these populations will be present in the Array Area regularly during the breeding season. All three species are migratory, arriving from southern Europe and the African continent in spring and returning in autumn. There is a small risk that individuals from these populations may pass through the Array Area on migration.

6.10.5.2 Roseate terns were not recorded in the 2018-20 aerial surveys, so this species is not considered to be at risk of any effects at the Array Area. Furthermore, these tern species tend to migrate close to the coast when that is an option (Wernham *et al.,* 2002), and so it is likely that only a very small proportion of the population would pass through the Array Area because of their habitat preference for foraging during migration in sheltered coastal waters.

6.10.5.3 Furness (2015) estimated the population of common terns which pass through UK Western waters, including the Irish Sea as 64,659, and that of Arctic terns as 71,398, although these figures related to UK waters, therefore the totals including Irish waters would be expected to be higher still. Consequently, since the SPA populations represent very small fractions of the wider population of migrating terns passing through the Irish Sea on migration, this means that only a small percentage of any impacts would be attributed to the SPA. Therefore, due to the very low risk of collisions (and only whilst on migration), displacement or barrier effects affecting these populations, LSE upon these breeding SCI species can be excluded at the screening stage. This is the case in the absence of mitigation measures.

6.10.6 Grassholm SPA

6.10.6.1 Grassholm SPA is designated for breeding gannet and is located 106.9 km from the Proposed Development. Gannet maximum foraging range is 709 km, and the mean maximum is 315 km (Woodward *et al.,* 2019), therefore there is potential for connectivity between the SPA and the Array Area. Gannets are not considered to be at risk of displacement (due to their long foraging range and the wide range of prey species taken) or barrier effects (again due to their long foraging range), however a proportion of flight time is spent at rotor height and therefore there is a risk of collisions. Tracking of gannets from breeding colonies around the British Isles (Wakefield *et al.,* 2013) has demonstrated that regions of sea within range of two neighbouring colonies are typically used by the more distant population to a very much lower extent than would be predicted on the basis of distance alone, with competition between colonies leading to mutually exclusive foraging areas so that all breeding adults in the area originate from the same, nearby, colony.

6.10.6.2 In the case of the southern Irish Sea and southwest approaches, extensive multi-year tracking data show that gannets from Grassholm do not appear to forage in the vicinity of the Array Area, due to the presence of birds from the nearer Saltee Islands SPA colony (Wakefield *et al.,* 2013). Therefore, to present a worst-case scenario, any collision mortality of adult gannets in the breeding season should be apportioned to the Saltee Islands SPA population, and there is a very low likelihood of connectivity between the Grassholm SPA gannet population and the Array Area. On that basis, LSE upon this breeding SCI species at Grassholm SPA can be excluded at the screening stage. This is the case in the absence of mitigation measures.

6.10.7 Howth Head Coast SPA

6.10.7.1 Howth Head Coast SPA is designated for breeding kittiwake. The SPA is located 58.63 km from the Proposed Development. Kittiwake maximum foraging range is 770 km, and the mean maximum is 156 km (Woodward *et al.,* 2019), therefore there is potential for connectivity between the SPA and the Array Area during the breeding season. Kittiwakes are not considered to be at

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risk of displacement or barrier effects (Furness and Wade, 2012); however, a proportion of flight time is spent at rotor height and therefore there is a risk of collisions. On this basis, LSE upon this breeding SCI species cannot be excluded at the screening stage in the absence of further evaluation and analysis or mitigation measures.

6.10.8 Ireland's Eye SPA

6.10.8.1 Ireland's Eye SPA is designated for breeding kittiwake, herring gull, cormorant, guillemot and razorbill. The SPA is located 52.81 km from the Proposed Development. Kittiwake maximum foraging range is 770 km, and the mean maximum is 156 km (Woodward *et al.,* 2019), therefore there is potential for breeding season connectivity between the SPA and the Array Area. Gulls, including kittiwakes are not considered to be at risk of displacement or barrier effects as they have been found to show little or no aversion to wind turbines and other structures in the marine environment. However, a proportion of flight time is spent at rotor height and therefore there is a risk of collisions. On this basis, LSE upon this breeding SCI species cannot be excluded at the screening stage in the absence of further evaluation and analysis or mitigation measures.

6.10.8.2 Herring gulls have a maximum foraging range of 92 km and a mean maximum of 58 km (Woodward *et al.,* 2019), therefore there is potential for connectivity between the Array Area and the SPA. This species is not considered at risk of displacement or barrier effects; however, a proportion of flight time is spent at rotor height and therefore there is a risk of collisions. On this basis, likely significant collision risk effects upon this breeding SCI species cannot be excluded at the screening stage in the absence of further evaluation and analysis or mitigation measures.

6.10.8.3 Cormorants have a maximum foraging range of 35 km (Woodward *et al.,* 2019) and fly close to the sea surface. Therefore, no collisions are predicted for this species. Cormorants are not considered to be at risk of displacement or barrier effects (Furness and Wade, 2012), and indeed tend to benefit from the presence of offshore windfarm structures where they can rest on structures above the water line (e.g. Leopold and Verdaat, 2018) and extend their offshore foraging range, so cormorant numbers tend to increase when offshore windfarms are constructed (Dierschke *et al.,* 2016). Therefore, LSE upon this breeding SCI species can be excluded at the screening stage. This is the case in the absence of mitigation measures.

6.10.8.4 Guillemots have a maximum foraging range of 338 km and a mean maximum of 73 km (Woodward *et al.,* 2019), therefore there is potential for connectivity for this species in the breeding season. Guillemots fly close to the sea surface and hence have very low risks of collision; however, the species may be subject to displacement and barrier effects (Furness and Wade, 2012). Therefore, LSE upon this breeding SCI species cannot be excluded at the screening stage in the absence of further evaluation and analysis or mitigation measures.

6.10.8.5 Razorbills have a maximum foraging range of 313 km and a mean maximum of 89 km (Woodward *et al.,* 2019), and therefore there is potential for connectivity for this species in the breeding season. Razorbills fly close to the sea surface and are therefore at very low risk of collisions. However, the species may be subject to displacement and barrier effects. On this basis, LSE upon this breeding SCI species cannot be excluded at the screening stage in the absence of further evaluation and analysis or mitigation measures.

6.10.8.6 LSE on Ireland's Eye SPA cannot be excluded at the screening stage for potential collision effects on kittiwake and herring gull, and potential displacement effects for guillemot and razorbill.

6.10.9 Irish Sea Front SPA

6.10.9.1 Irish Sea Front SPA is located in the Irish Sea, about 35 km southwest of the Isle of Man and 36 km to the northwest of Anglesey. It is 92.86 km from the Proposed Development. The site is known to regularly support a population of European importance of Manx shearwaters, which are likely to use the area as a foraging location during the breeding season. This site is located over

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part of a large tidal front which forms in the spring every year. This tidal front creates an area of very productive sea, with high concentrations of zooplankton leading to large numbers of prey species contributing to the site's importance for foraging Manx shearwaters.

6.10.9.2 Since this designation protects a foraging area rather than a breeding colony, it is not appropriate to consider connectivity to this wholly marine SPA on the basis of the species' foraging range from breeding colonies, and the Array Area does not lie between any breeding colonies and the SPA. There is no reason to believe that Manx shearwaters that aggregate within the Irish Sea Front SPA would also aggregate at the Array Area or would have reason to commute through the Array Area (JNCC, 2023).

6.10.9.3 The high concentration of Manx shearwaters in the Irish Sea Front SPA reflects the high aggregation there of suitable prey that are easily caught at a predictable frontal system. Therefore, birds will tend to remain at the SPA site until they have the food they need, and may then move elsewhere, but are very unlikely to move to the Array Area rather than to breeding colonies. Therefore, the risk of connectivity will be very low. On this basis, LSE upon this breeding SCI species can be excluded at the screening stage. This is the case in the absence of mitigation measures.

6.10.10 Keeragh Islands SPA

6.10.10.1 Keeragh Islands SPA is designated for breeding cormorant and is located 72.29 km from the Proposed Development. Cormorants have a maximum foraging range of 35 km and fly close to the sea surface. Therefore, no collisions are predicted for this species and the potential for connectivity between the SPA and the Array Area is extremely small. Cormorants are not considered to be at risk of displacement or barrier effects, and indeed tend to benefit from the presence of offshore windfarm structures where they can rest and extend their offshore foraging range, so that numbers of cormorants tend to increase when offshore windfarms are constructed (Dierschke *et al.,* 2016). Therefore, LSE upon this breeding SCI species can be excluded at the screening stage. This is the case in the absence of mitigation measures.

6.10.11 Lady's Island Lake SPA

6.10.11.1 Lady's Island Lake SPA is designated for breeding black-headed gull, Sandwich tern, roseate tern, common tern and Arctic tern. The SPA is located 57.08 km from the Proposed Development. This is beyond the mean maximum foraging range of all the designated species (black-headed gull: 18 km, Sandwich tern: 34 km, roseate tern: 13 km, common tern: 18 km, Arctic tern: 26 km; Woodward *et al.,* 2019). Therefore, the predicted connectivity between the SPA and the Proposed Development is very small during the breeding season. As the SPA is located to the south of the Array Area it is very unlikely that migratory movements of terns from the SPA would cross the Array Area, because SPA birds would be expected to migrate to and from wintering areas to the south so would take a route that would not reach as far north as the Array Area. On this basis, LSE upon these breeding SCI species can be excluded at the screening stage. This is the case in the absence of mitigation measures.

6.10.12 North-West Irish Sea cSPA

6.10.12.1 The North-west Irish Sea cSPA was proposed in July 2023 and comprises an area of sea of importance for a range of breeding and non-breeding species. At the time of writing, beyond the list of species, very little additional information is currently available about the cSPA, However, with respect to the potential for the features of this cSPA to have connectivity with the Proposed Development, the key consideration is that the site is proposed to protect an area used for feeding, roosting and other maintenance behaviours (e.g. loafing). On this basis, there is no pathway for connectivity between the Proposed Development and the cSPA and therefore the risk of a likely significant effect for all the designated features can be excluded.

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6.10.13 Lambay Island SPA

6.10.13.1 Lambay Island SPA is designated for breeding fulmar, cormorant, shag, lesser black-backed gull, herring gull, kittiwake, guillemot, razorbill and puffin. The SPA is located 61.58 km from the Proposed Development. Fulmars have a mean maximum foraging range of 542 km so there is potential for connectivity between the SPA and the Proposed Development for this QI. However, this species flies close to the sea surface (e.g. Johnston *et al.,* 2014) and therefore has very low risks of collision. The species is not considered at risk of displacement or barrier effects. On this basis, LSE upon this breeding SCI species can be excluded at the screening stage. This is the case in the absence of mitigation measures.

6.10.13.2 The Proposed Development is beyond the maximum foraging range of cormorant (35 km) and shag (46 km) and therefore the risk of a likely significant effect for these species can also be excluded.

6.10.13.3 Lesser black-backed gulls have a maximum foraging range of 533 km and a mean maximum range of 127 km, so there is potential for connectivity for this species between the SPA and the Array Area. Gulls, including lesser-black backed gull, are not considered to be at risk of displacement or barrier effects as they have been found to show little or no aversion to wind turbines and other structures in the marine environment (Bradbury *et al.,* 2017). Therefore, this species is not considered at risk of displacement or barrier effects but is at risk of collisions. On the basis of connectivity, likely significant collision risk effects upon this breeding SCI species cannot be excluded at the screening stage in the absence of further evaluation and analysis or mitigation measures.

6.10.13.4 Herring gulls have a maximum foraging range of 92 km and a mean maximum of 58 km (Woodward *et al.,* 2019) so there is potential for connectivity for this species between the SPA and the Array Area. Gulls, including herring gull, are not considered to be at risk of displacement or barrier effects as they have been found to show little or no aversion to wind turbines and other structures in the marine environment. This species does spend a proportion of flight time at rotor height and therefore there is at risk of collisions. Therefore, this species is not considered at risk of displacement or barrier effects but is at risk of collisions. On the basis of connectivity, likely significant collision risk effects upon this breeding SCI species cannot be excluded at the screening stage in the absence of further evaluation and analysis or mitigation measures.

6.10.13.5 Kittiwake maximum foraging range is 770 km, and the mean maximum is 156 km (Woodward *et al.,* 2019), and therefore there is potential for breeding season connectivity between the SPA and the Array Area. Kittiwakes are not considered to be at risk of displacement or barrier effects; however, a proportion of flight time is spent at rotor height and therefore there is a risk of collisions. On this basis, LSE upon this breeding SCI species cannot be excluded at the screening stage in the absence of further evaluation and analysis or mitigation measures.

6.10.13.6 Guillemots have a maximum foraging range of 338 km and a mean maximum of 73 km, therefore there is potential for connectivity for this species in the breeding season. Guillemots fly close to the sea surface and hence have very low risks of collision; however, the species may be subject to displacement and barrier effects. On this basis, LSE upon this breeding SCI species cannot be excluded at the screening stage in the absence of further evaluation and analysis or mitigation measures.

6.10.13.7 Razorbills have a maximum foraging range of 313 km and a mean maximum of 89 km, therefore there is potential for connectivity for this species in the breeding season. Razorbills fly close to the sea surface and are therefore at very low risk of collisions, however the species may be subject to displacement and barrier effects. On this basis, LSE upon this breeding SCI species cannot be excluded at the screening stage in the absence of further evaluation and analysis or mitigation measures.

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6.10.13.8 Puffins have a maximum foraging range of 383 km and a mean maximum of 137 km, therefore there is potential for connectivity for this species in the breeding season. Puffins fly close to the sea surface and hence have very low risks of collision; however, the species may be subject to displacement and barrier effects. Very few puffins were recorded within the Array Area and 4 km buffer, with a maximum abundance of 10 in the breeding season, of which less than one individual would be at risk of displacement mortality before any consideration of apportionment between SPA colonies. On this basis, LSE upon this breeding SCI species can be excluded at the screening stage. This is the case in the absence of mitigation measures.

6.10.13.9 LSE on Lambay SPA cannot be excluded at the screening stage due to potential collision effects on lesser black-backed gull, herring gull and kittiwake, and potential displacement effects for guillemot and razorbill.

6.10.14 Northern Cardigan Bay SPA

6.10.14.1 Northern Cardigan Bay SPA is designated for wintering red-throated diver. The SPA is located 98.48 km from the Proposed Development. As this SPA is designated for a wintering population it is not appropriate to consider the species' foraging range from breeding sites. The SPA is considered to provide high quality foraging habitat for red-throated divers, so there is therefore no anticipated connectivity between the SPA and the Proposed Development. While the species could be at risk on migration, the Array Area does not lie on a known migration route to and from the SPA. LSE upon this breeding SCI species can be excluded at the screening stage. This is the case in the absence of mitigation measures.

6.10.15 Rockabill SPA

6.10.15.1 Rockabill SPA is designated for breeding roseate, common and Arctic terns. The SPA is located 70.98 km from the Proposed Development. This is beyond the maximum foraging ranges of these tern species (Woodward *et al.,* 2019). Therefore, there is no risk that birds from these population will be present in the Array Area during the breeding season. All three species are migratory, arriving from the south in spring and returning in autumn. There is a small risk that individuals from these populations may pass through the Array Area on migration. However, these tern species tend to migrate close to the coast when that is an option (Wernham *et al.,* 2002), and so it is likely that only a very small proportion of the population would pass through the Array Area because of their habitat preference for foraging during migration in sheltered coastal waters. Therefore, the potential for a collision risk effect is very small. LSE upon these breeding SCI species can be excluded at the screening stage. This is the case in the absence of mitigation measures.

6.10.16 Saltee Islands SPA

6.10.16.1 Saltee Islands SPA is designated for breeding fulmar, gannet, cormorant, shag, lesser black-backed gull, herring gull, kittiwake, guillemot, razorbill and puffin. The SPA is located 70.35 km from the Proposed Development.

6.10.16.2 Fulmars have a mean maximum foraging range of 542 km so there is potential for connectivity between the SPA and the Proposed Development for this species. However, this species flies close to the sea surface. The species is not considered at risk of displacement or barrier effects and therefore a likely significant effect can be excluded at the screening stage for this species. This is the case in the absence of mitigation measures.

6.10.16.3 Gannet maximum foraging range is 709 km, and the mean maximum is 315 km (Woodward *et al.,* 2019), therefore there is potential for connectivity between the SPA and the Proposed Development. Gannets are considered to be potentially at risk of both displacement and collision

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risks. It is therefore appropriate to consider that a likely significant effect cannot be excluded at the screening stage in the absence of further evaluation and analysis or mitigation measures.

6.10.16.4 The SPA is beyond the maximum foraging range of cormorant (35 km) and shag (46 km) and therefore the risk of a likely significant effect can be excluded at the screening stage for this species. That is the case in the absence of mitigation measures.

6.10.16.5 Lesser black-backed gulls have a maximum foraging range of 533 km and a mean maximum of 127 km so there is potential for connectivity for this species between the SPA and the Proposed Development. This species is not however considered at risk of displacement or barrier effects but is considered at risk of collisions. On this basis, likely significant collision risk effects upon this breeding SCI species cannot be excluded at the screening stage in the absence of further evaluation and analysis or mitigation measures.

6.10.16.6 Herring gulls have a maximum foraging range of 92 km and a mean maximum of 58 km (Woodward *et al.,* 2019) so there is potential for connectivity for this species between the SPA and the Proposed Development. This species is not however considered at risk of displacement or barrier effects but is considered at risk of collisions. On this basis, likely significant collision risk effects upon this breeding SCI species cannot be excluded at the screening stage in the absence of further evaluation and analysis or mitigation measures.

6.10.16.7 Razorbills have a maximum foraging range of 313 km and a mean maximum of 89 km, therefore there is potential for connectivity for this species in the breeding season. Razorbills fly close to the sea surface and are therefore at very low risk of collisions, however the species may be subject to displacement and barrier effects. On this basis, LSE upon this breeding SCI species cannot be excluded at the screening stage in the absence of further evaluation and analysis or mitigation measures.

6.10.16.8 Puffins have a maximum foraging range of 383 km and a mean maximum of 137 km, therefore there is potential for connectivity for this species in the breeding season. Puffins fly close to the sea surface and hence have very low risks of collision; however, the species may be subject to displacement and barrier effects. Very few puffins were recorded within the Array Area and 4 km buffer, with a maximum abundance of 10 in the breeding season, of which less than one individual would be at risk of displacement mortality before any consideration of apportionment between SPA colonies. On this basis, LSE upon this breeding SCI species can be excluded at the screening stage. This is the case in the absence of mitigation measures.

6.10.16.9 Kittiwake maximum foraging range is 770 km, and the mean maximum is 156 km (Woodward *et al.,* 2019), therefore while there is potential for connectivity for this species in the breeding season. Kittiwakes are not considered to be at risk of displacement or barrier effects; however, a proportion of flight time is spent at rotor height and therefore there is a risk of collisions. On this basis, LSE upon this breeding SCI species cannot be excluded at the screening stage in the absence of further evaluation and analysis or mitigation measures.

6.10.16.10 Guillemots have a maximum foraging range of 338 km and a mean maximum of 73 km, therefore there is potential for connectivity for this species in the breeding season. Guillemots fly close to the sea surface and hence have very low risks of collision; however, the species may be subject to displacement and barrier effects. On this basis, LSE upon this breeding SCI species cannot be excluded at the screening stage in the absence of further evaluation and analysis or mitigation measures.

6.10.16.11 Thus, LSE on Saltee Islands SPA cannot be excluded at the screening stage for potential collision effects on gannet, lesser black-backed gull, herring gull and kittiwake, and potential displacement effects for guillemot and razorbill.

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6.10.17 Seas off Wexford SPA

6.10.17.1 The Seas off Wexford SPA was designated in January 2024 and comprises an area of sea of importance for a range of breeding and non-breeding species for foraging and roosting. The SPA is stated as being ecologically linked to four breeding seabird SPAs; Lady's Island Lake SPA, Wexford Harbour and Slobs SPA, Keeragh Islands SPA and Saltee Islands SPA. The Proposed Development does not lie between the Seas off Wexford SPA and these four named colonies, and since the SPA also exists to protect an area of sea (rather than a breeding colony), it is therefore not appropriate to apply foraging range-based connectivity between the Proposed Development and the SPA. Thus, there is no pathway for connectivity between the Proposed Development and the SPA and therefore the risk of a likely significant effect for all the designated features can be excluded.

6.10.18 Skerries Islands SPA

6.10.18.1 Skerries Islands SPA is designated for breeding cormorant, shag and herring gull. The SPA is located 72.03 km from the Proposed Development. The SPA is beyond the maximum foraging range of cormorant (35 km) and shag (46 km) and therefore the risk of a likely significant effect for these species is ruled out.

6.10.18.2 Herring gulls have a maximum foraging range of 92 km and a mean maximum of 58 km (Woodward *et al.,* 2019) so there is potential for connectivity for this species between the SPA and the Proposed Development. This species is not however considered at risk of displacement or barrier effects but is considered at risk of collisions. On this basis, likely significant collision risk effects upon this breeding SCI species cannot be excluded at the screening stage in the absence of further evaluation and analysis or mitigation measures.

6.10.19 South Dublin Bay and River Tolka Estuary SPA

6.10.19.1 South Dublin Bay and River Tolka Estuary SPA is designated for wintering wildfowl and waders, but also hosts breeding black-headed gull, roseate, common and Arctic terns (although these are not named QIs on the designation). The SPA is located 43.54 km from the Proposed Development. This is beyond the maximum foraging range of all the designated breeding species (black-headed gull: 19 km, roseate tern: 24 km, common tern: 30 km, Arctic tern: 46 km; Woodward *et al.,* 2019). Therefore, there is no predicted connectivity between the SPA and the Proposed Development in the breeding season.

6.10.19.2 All three tern species are migratory, arriving from the south in spring and returning in autumn. There is a small risk that individuals from these populations may pass through the Array Area on migration. Wintering black-headed gulls are likely to originate from a range of locations and have a very large population, therefore very few individuals from the SPA population are likely to be at risk of impacts.

6.10.19.3 The tern species tend to migrate close to the coast when that is an option (Wernham *et al.,* 2002), and so it is likely that only a very small proportion of the population would pass through the Array Area because of their habitat preference for foraging during migration in sheltered coastal waters. Roseate terns were not recorded in the 2018-20 aerial surveys, so this species is not considered to be at risk of any effects at the Proposed Development.

6.10.19.4 Furness (2015) estimated the population of common terns which pass through UK Western waters, including the Irish Sea, as 64,659, and that of Arctic terns as 71,398, although these figures related to UK waters, therefore the totals including Irish waters would be expected to be higher still. Consequently, since the SPA populations represent very small fractions of the wider population of migrating terns passing through the Irish Sea on migration, this means that only a small percentage of any impacts would be attributed to the SPA. Therefore, due to the very low risk of collisions (and only whilst on migration), displacement or barrier effects affecting these

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populations, LSE upon these breeding SCI species can be excluded at the screening stage. This is the case in the absence of mitigation measures.

6.10.20 The Murrough SPA

6.10.20.1 The Murrough SPA is designated for breeding little tern and wintering red-throated diver, black-headed gull and herring gull. The SPA is 7.05 km from the Proposed Development (at its closest point). Little tern maximum foraging range is 5 km (Woodward *et al.,* 2019), and the little tern breeding colony is located at the northern end of the SPA and is therefore more than 20 km from the Proposed Development. On this basis, breeding season connectivity is considered to be unlikely. The potential for a collision risk effect is very small. LSE upon this breeding SCI species can be excluded at the screening stage. This is the case in the absence of mitigation measures.

6.10.20.2 The SPA is designated for wintering red-throated divers, so it is not appropriate to consider foraging ranges in determining the potential for connectivity. Since the site has been identified as the area of importance itself, the likelihood of connectivity is considered very small. Red-throated divers fly very low to the sea surface, and as such the risks of collisions are extremely small and can be ruled out, however this species is considered to be among the more sensitive to displacement from offshore windfarms (Percival, 2013, 2014). Given the distance between the SPA and the Proposed Development, the risk of disturbance to the wintering red-throated divers on the SPA is very small. LSE upon this SCI species can therefore be excluded at the screening stage. This is the case in the absence of mitigation measures.

6.10.20.3 Wintering herring gulls and black-headed gulls from the SPA may have connectivity with the Proposed Development (but breeding season foraging ranges are not appropriate for screening the likelihood of wintering connectivity). Whilst these species are not at risk of displacement, a proportion of flight time is spent at rotor height, so they are at risk of collisions. However, overwintering populations of the species are widely distributed and are not constrained by the requirement to remain close to a particular location (i.e. compared with central place foraging from a nest site during the breeding season). Due to the low probability of connectivity and the nature of the designation (wintering QIs), LSE upon these SCI species can be excluded at the screening stage. This is the case in the absence of mitigation measures.

6.10.21 The Raven SPA

6.10.21.1 The Raven SPA is designated for wintering cormorant and red-throated diver and is located 33.75 km from the Proposed Development. Both species fly very low to the sea surface, therefore the risks of collisions are extremely small and can be ruled out. The SPA is beyond the distance from the Proposed Development at which disturbance effects could occur, and as such due to the very low risk of collision, and absence of displacement or barrier effects affecting these populations, LSE upon these SCI species can be excluded at the screening stage. This is the case in the absence of mitigation measures.

6.10.22 Wexford Harbour and Slobs SPA

6.10.22.1 Wexford Harbour and Slobs SPA is designated for a wide range of wintering wildfowl and waders, as well as a small number of seabirds: cormorant, black-headed gull and lesser black-backed gull. Wintering lesser black-backed gulls and black-headed gulls from the SPA may have connectivity with the Proposed Development (but breeding season foraging ranges are not appropriate for screening the likelihood of wintering connectivity). Whilst these species are not at risk of displacement, a proportion of flight time is spent at rotor height, so they are at risk of collisions. However, overwintering populations of the species are widely distributed and are not constrained by the requirement to remain close to a particular location (i.e. compared with central place foraging from a nest site during the breeding season). As an active port, construction vessels will represent a very small additional source of disturbance, and will follow existing vessel

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routes, therefore there will be no risk of LSE. Due to the low probability of connectivity and the nature of the designation (wintering QIs), LSE upon these SCI species can be excluded at the screening stage. This is the case in the absence of mitigation measures.

6.10.23 Wicklow Head SPA

6.10.23.1 Wicklow Head SPA is designated for breeding kittiwake and is located a minimum of 5.27 km from the Proposed Development. Kittiwakes have a maximum foraging range of 770 km and a mean maximum of 156 km, so connectivity is likely between the SPA and the Proposed Development in the breeding season. Outside the breeding season kittiwakes migrate from colonies to over-wintering regions distributed throughout the Atlantic and adjoining seas (e.g. the Irish Sea and North Sea). Therefore, individuals recorded outside the breeding season may originate from a very wide range (the biogeographic population is over five million individuals; Furness, 2015).

6.10.23.2 While individuals from Wicklow Head SPA are likely to represent a relatively small component of this regional non-breeding season population, there remains a risk of collision during this period to affect the SPA population.

6.10.23.3 On this basis, LSE upon this breeding SCI species cannot be excluded at the screening stage in the absence of further evaluation and analysis or mitigation measures.

6.11 Terrestrial and Freshwater QIs

6.11.1.1 Of all the SAC QIs considered, there are a number within the designated sites scoped in that include solely terrestrial or freshwater QIs (entirely located above the high tide line or comprising of freshwater). These have all been scoped out due to there being no pathway to effect and are listed in Appendix 1: Table 11.1 and Table 11.2.

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7 Stage 1 Screening Appraisal, Consideration of LSE In-combination

7.1 Requirements

7.1.1.1 Article 6(3) of the Habitats Directive requires that in-combination effects with other plans or projects are also considered. As set out in the Commission's 2018 Notice (European Commission, 2019), significance of effect will vary depending on factors such as magnitude of impact, type, extent, duration, intensity, timing, probability, cumulative effects and the vulnerability of the habitats and species concerned. EC (2019) specifically advises that "as regards other proposed plans or projects, on grounds of legal certainty it would seem appropriate to restrict the in-combination provision to those which have been actually proposed, i.e. for which an application for approval or consent has been introduced". Any plans that have been drafted but not formally adopted are also considered. The significance of any identified combined effects of the Proposed Development alongside other past, present or reasonably foreseeable future plans or projects must be evaluated. In that context, plans or projects which are completed, approved but uncompleted, or proposed have been considered.

7.2 Approach

7.2.1.1 For screening, there is a presumption that where a potential for LSE has been identified for the Proposed Development alone, then potential LSE in-combination applies. For sites where no LSE was identified alone but a potential pathway for effect remained, these sites were screened through to AA for in-combination consideration only. However, for sites where no LSE was identified alone based on a lack of pathway or negligible impact risk (i.e. no material contribution from the project to an effect), no LSE in-combination could also be concluded, and these sites were not screened through to AA. All the designated sites that are therefore screened into the AA in-combination assessment for one or more features are as follows:

- Slaney River Valley SAC;
- River Barrow and River Nore SAC;
- Lower River Suir SAC;
- Magherabeg Dunes SAC;
- Buckroney-Brittas Dunes and Fen SAC;
- Kilpatrick Sandhills SAC;
- The Murrough Wetlands SAC;
- Cahore Polders and Dunes SAC;
- Wicklow Reef SAC;
- Blackwater Bank SAC;
- Bristol Channel Approaches/ Dynesfeydd Môr Hafren SAC;
- Cardigan Bay/ Bae Ceredigion SAC;
- Lambay Island SAC;
- Lower River Suir SAC;
- North Anglesey Marine/ Gogledd Môn Forol SAC;
- North Channel SAC;
- Lleyn Peninsula and the Sarnau/ Pen Llyn a`r Sarnau SAC;
- River Barrow and River Nore SAC;
- River Boyne and River Blackwater SAC;
- Rockabill to Dalkey Island SAC;

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- Saltee Islands SAC;
- West Wales Marine/ Gorllewin Cymru Forol SAC;
- Roaringwater Bay and Islands SAC;
- Blasket Islands SAC;
- Nord Bretagne DH SAC;
- Récifs et landes de la Hague (FR) SAC;
- Anse de Vauville (FR) SAC;
- Banc et récifs de Surtainville (FR) SAC;
- Côte de Granit Rose-Sept Iles SAC;
- Mers Celtiques - Talus du golfe de Gascogne SAC;
- Chausey (FR) SAC;
- Tregor Goëlo (FR) SAC;
- Côte de Granit rose-Sept-Iles (FR) SAC;
- Mers Celtiques - Talus du golfe de Gascogne (FR) SAC;
- Cap d'Erquy-Cap Fréhel (FR) SAC;
- Baie de Morlaix (FR) SAC;
- Abers - Côtes des legends (FR) SAC;
- Baie du Mont Saint-Michel (FR) SAC;
- Baie de Saint-Brieuc – Est (FR) SAC;
- Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard (FR) SAC;
- Estuaire de la Rance (FR) SAC;
- Ouessant-Molène (FR) SAC;
- Côtes de Crozon (FR) SAC;
- Chaussée de Sein (FR) SAC;
- The Murrough SPA;
- Cahore Marshes SPA;
- Wexford Harbour and Slobs SPA;
- South Dublin Bay and River Tolka Estuary SPA;
- North Bull Island SPA;
- Wicklow Head SPA;
- Howth Head Coast SPA;
- Ireland's Eye SPA;
- Lambay Island SPA;
- Saltee Islands SPA;
- Skerries Island SPA; and
- River Nanny Estuary and Shore SPA.

7.2.1.2 As established above, the in-combination assessment for LSE has been deferred to the AA on a precautionary basis, to ensure that the most comprehensive and up to date in-combination considerations are assessed. However, a comprehensive list of projects and plans to be considered in the AA in-combination assessment is provided in section 7.3.

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7.3 Plans and Projects Screened in for In-combination Assessment

7.3.1.1 Table 7.1 through Table 7.4 below provide a list of plans and projects to be considered in the in-combination assessment for Annex I habitats, migratory fish, marine mammals, wader and wild and seabird populations.

Table 7.1: List of other projects and plans considered within the in-combination assessment for Annex I coastal and marine habitats

Project/Plan	Status	Distance from Array Area (km)	Distance from Cable Corridor and Working Areas	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
Tier 1							
Arklow Bank Wind Park 1 Power Cable	Operational	0.0	0.0	Power	Complete	Ongoing	Temporal overlap of operational phase with the Proposed Development construction and operation and maintenance phases.
ABWP1	Operational	0.0	0.5	Initial foreshore lease granted in 2002	Complete	Ongoing	Temporal overlap of operational phase with the Proposed Development construction and operation and maintenance phases.
Arklow Waste Water Treatment Plant	Construction	3.4	10.8	Relates to ABWP2. The Project (proposed development) will comprise a new Wastewater Treatment Plant (WwTP), associated infrastructure including the interceptor sewer network and marine outfalls as well as an upgrade to the	2021-2024	2025 onwards	Temporal overlap of operational phase with the Proposed Development construction and operation and maintenance phases.

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Project/Plan	Status	Distance from Array Area (km)	Distance from Cable Corridor and Working Areas	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
				existing coastal revetment. 80% Complete as of 2022.			
Development to the south of South Quay Arklow-ABWP2 OMF	Approved	4.3	11.9	Relates to ABWP2. As part of the works, a pontoon is proposed along with up to 4 cranes for loading & unloading of vessels. Additionally, dredging of approximately 6,000 m^3 of material from the nearshore is also proposed, to provide for navigational depth, berthing area and manoeuvring area for vessels.	2026-2033	2034 onwards	Temporal overlap of construction and operational phases with the Proposed Development construction and operation and maintenance phases.
Hibernia Atlantic	Operational	15.4	14.8	Telecom	Complete	Ongoing	Temporal overlap of operational phase with the Proposed Development construction and operation and maintenance phases.
Irish Mussel Seed Company Ltd.	Operational	9.9	5.3	Aquaculture	Complete	Ongoing	Temporal overlap of operational phase with the Proposed Development construction and operation and maintenance phases.

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Project/Plan	Status	Distance from Array Area (km)	Distance from Cable Corridor and Working Areas	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
Wicklow Port Company dredge disposal	*Operational*	*8.8*	*7.9*	*Dredge disposal*	*N/A*	*2024 onwards*	Potential for temporal overlap of operation with Proposed Development construction and Operational and Maintenance phases.
Tier 3							
ABWP1	Decommissioning	0.0	0.5	ABWP 1 which is an operational OWF decommissioning phase activities			Temporal overlap of operational phase with the Proposed Development construction phase.
Phase 1 Projects							
Codling Wind Park (formerly known as Codling I and Codling II)	Early planning	18.2	17.3	Updated application expected to be made under the Maritime Area Planning Act 2021. Scoping Report indicates up to 140 wind turbines and up to five OSPs (CWP, 2020).	2027 - 2028	2028 onwards	Potential for temporal overlap of construction and operation with Proposed Development construction and operation and maintenance phases.

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Table 7.2: List of other projects and plans considered within the in-combination assessment for migratory fish

Project/Plan	Status	Distance from Array Area (km)	Distance from Export Cable Corridors and working areas	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
Tier 1							
ABWP1	Operational	0	0.5	Initial foreshore lease granted in 2002"	Complete	2021 onwards	Temporal overlap of operational phase with the Proposed Development construction and operation and maintenance phases.
Hibernia Atlantic Telecom	Operational	15.4	14.8	Telecom	Complete	2021 onwards	Potential for temporal overlap of operation with Proposed Development construction and operation and maintenance phases.
UK-Ireland 2 Telecom	Operational	39.0	38.4	Telecom	Complete	2021 onwards	Potential for temporal overlap of operation with Proposed Development construction and operation and

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Project/Plan	Status	Distance from Array Area (km)	Distance from Export Cable Corridors and working areas	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
							maintenance phases.
ESAT 2	Operational	46.3	45.4	Telecom	2021	2021 onwards	Potential for temporal overlap of operation with Proposed Development construction and operation and maintenance phases.
CeltixConnect - Sea Fibre Networks	Operational	49.2	48.3	Telecom cable	2022 - 2026	2026 onwards	Potential for temporal overlap of operation with Proposed Development construction and operation and maintenance phases.
Arklow Bank dredge disposal	Operational	0.0	0.8	Dredge disposal	N/A	2021 onwards	Potential for temporal overlap with Proposed Development construction and operation and maintenance phases.

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Project/Plan	Status	Distance from Array Area (km)	Distance from Export Cable Corridors and working areas	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
Hibernia Atlantic – Hibernia C	Operational	54.8	53.9	Telecom	Complete	2021 onwards	Potential for temporal overlap of operation with Proposed Development construction and operation and maintenance phases.
ZAYO Emerald Bridge One - Telecom	Operational	58.5	57.6	Telecom	Complete	2021 onwards	Potential for temporal overlap of operation with Proposed Development construction and operation and maintenance phases.
SIRIUS South - Telecom	Operational	58.7	57.8	Telecom	Complete	2021 onwards	Potential for temporal overlap of operation with Proposed Development construction and operation and maintenance phases.

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Project/Plan	Status	Distance from Array Area (km)	Distance from Export Cable Corridors and working areas	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
Wicklow Port Company dredge disposal	Operational	8.8	7.9	Dredge disposal	N/A	2024 onwards	Potential for temporal overlap of operation with Proposed Development construction and operation and maintenance phases.
Tier 3							
Mares Connect	Proposed	37.5	36.6	Power cable	2024 - 2027	2027 onwards	Potential for temporal overlap of construction and operation with Proposed Development construction and operation and maintenance phases.
ABWP1	Decommissioning	0.0	0.5	ABWP 1 which is an operational OWF decommissioning phase activities			Temporal overlap of operational phase with *the Proposed* Development construction phase.
Phase 1 Projects							

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Project/Plan	Status	Distance from Array Area (km)	Distance from Export Cable Corridors and working areas	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
Codling Wind Park (formerly known as Codling I and Codling II)	Early planning	18.2	17.3	Updated application expected to be made under the Maritime Area Planning Act 2021. Scoping Report indicates up to 140 wind turbines and up to five OSPs (CWP, 2020).	2027 - 2028	2028 onwards	Potential for temporal overlap of construction and operation with Proposed Development construction and operation and maintenance phases.
Dublin Array (formerly known as Bray and Kish Offshore Windfarms)	Proposed	25.8	24.9	Updated application expected to be made under the Maritime Area Planning Act 2021. Scoping Report indicates up to 61 wind turbines with up to 308 m tip height and indicative hub height of 165.5 m above mean high water springs (Innogy, 2020).	2028-2032	2032 onwards	Potential for temporal overlap of construction and operation with Proposed Development construction and operation and maintenance phases.

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Project/Plan	Status	Distance from Array Area (km)	Distance from Export Cable Corridors and working areas	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
North Irish Sea Array	Early planning	65.1	64.1	Site investigation works from 2021-2026. Foreshore licence applied for surveys from summer 2020. Planning submission targeted 2023.	2027 - 2029	2029 onwards	Potential for temporal overlap of construction and operation with Proposed Development construction and operation and maintenance phases.

Table 7.3: List of other projects and plans considered within the in-combination assessment for marine mammals

Project/Plan	Status	Distance from Array Area (km)	Distance from Export Cable Corridors	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
Tier 1							
Saint-Brieuc	Under construction	480.6	479.9	A 496 MW offshore windfarm with 62 turbines.	2021 – 2024	From 2025	Potential cumulative impact exists.

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Project/Plan	Status	Distance from Array Area (km)	Distance from Export Cable Corridors	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
CeltixConnect	Active	49.2	48.3	Telecom cable.	2022 – 2026	From 2027	Potential for temporal overlap with Proposed Development construction phase.
Greenlink Interconnector	In construction	79.6	79.0	Power cable.	2021 – 2024	From 2025	Potential cumulative impact exists.
Celtic Interconnector	In construction	151.9	151.3	Power cable.	2023 – 2026	From 2027	Potential for temporal overlap with Proposed Development construction phase.
West Anglesey demonstration zone	Under construction	85.0	84.1	Tidal.	2023 – 2026	From 2027	Potential for temporal overlap with Proposed Development construction phase.

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Project/Plan	Status	Distance from Array Area (km)	Distance from Export Cable Corridors	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
Tier 2							
Erebus Floating Wind Demo	Consented	133.3	132.7	Consented for up to 7 turbines.	2025/2026 – 2026/2027	From 2028	Potential for temporal overlap with Proposed Development construction phase.
Awel y Môr	Consented	148.5	147.6	Consented for up to 50 turbines.	2026 – 2030	From 2031	Potential for temporal overlap with Proposed Development construction phase.
Atlantic Marine Energy Test Site	Consented	314.3	308.8	Test site for wave energy converters and floating wind.	2024 – 2025	From 2026	Potential cumulative impact exists.
Holyhead Deep	Consented	84.0	83.1	Tidal.	2026 – 2029	From 2030	Potential for temporal overlap with Proposed Development

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Project/Plan	Status	Distance from Array Area (km)	Distance from Export Cable Corridors	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
							construction phase.
Tier 3							
Valorous	Pre-planning application	141.9	141.3	Pre-lease offshore windfarm (Project planning and design phase).	2029	From 2030	Potential for temporal overlap with Proposed Development construction phase.
Mona	Planning application submitted	146.7	145.7	English Round 4 project with up to 107 turbines. Lease awarded.	2026 – 2027	From 2028	Potential for temporal overlap with Proposed Development construction phase.
Llyr 1	Pre-planning application	148.0	147.3	A 200 MW test and demonstration site for floating offshore wind	2026 – 2027	From 2028	Potential for temporal overlap with Proposed Development

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Project/Plan	Status	Distance from Array Area (km)	Distance from Export Cable Corridors	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
				with up to 10 turbines.			construction phase.
Llyr 2	Pre-planning application	151.9	151.2	A 200 MW test and demonstration site for floating offshore wind with up to 10 turbines.	2026 – 2027	From 2028	Potential for temporal overlap with Proposed Development construction phase.
Morgan	Pre-planning application	165.3	164.3	English Round 4 project with up to 96 turbines.	2028 – 2029	From 2030	Potential for temporal overlap with Proposed Development construction phase.
Morecambe	Pre-planning application	174.2	173.3	English Round 4 project with up to 40 turbines.	2026/2027 – 2028/2029	From 2030	Potential for temporal overlap with Proposed Development construction phase.

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Project/Plan	Status	Distance from Array Area (km)	Distance from Export Cable Corridors	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
White Cross	Planning application submitted	174.7	174.0	A 100 MW floating offshore wind demonstration project with up to 8 turbines.	2026 – 2027	From 2028	Potential for temporal overlap with Proposed Development construction phase.
Isle of Man (Mooir Vannin)	Pre-planning application	179.2	178.2	A 1.4 GW offshore windfarm with up to 100 turbines.	2030 – unknown	unknown	Potential for temporal overlap with Proposed Development construction phase.
North Channel Wind 2	Pre-planning application	204.0	203.1	A 420 MW offshore windfarm in Northern Ireland.	2029 – 2030	From 2031	Potential for temporal overlap with Proposed Development construction phase.
North Channel Wind 1	Pre-planning application	227.9	227.0	A 1 GW offshore windfarm in Northern Ireland.	2029 – 2030	From 2031	Potential for temporal overlap with Proposed

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Project/Plan	Status	Distance from Array Area (km)	Distance from Export Cable Corridors	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
							Development construction phase.
Mares Connect	Proposed	37.5	36.6	Power cable.	2024 – 2027	From 2028	Potential for temporal overlap with Proposed Development construction phase.
Xlinks	Proposed	192.3	191.6	Power cable.	2027 – 2029	From 2030	Potential for temporal overlap with Proposed Development construction phase.
Erebus / Valorous proposed cable route	Proposed	123.7	123.0	Power cable.	2025 – 2026	From 2027	Potential for temporal overlap with Proposed Development construction phase.

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Project/Plan	Status	Distance from Array Area (km)	Distance from Export Cable Corridors	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
LirIC	Proposed	204.6	203.7	Power cable.	Unknown – 2028	From 2029	Potential for temporal overlap with Proposed Development construction phase.
ABWP1	Decommissioning	0.0	0.5	ABWP 1 which is an operational OWF decommissioning phase activities			Temporal overlap of *operational phase with the Proposed Development construction phase.*
Phase 1 Projects							
Codling Wind Park (formerly known as Codling I and Codling II)	Early planning	18.2	17.3	Updated application expected to be made under the Maritime Area Planning Act 2021. Scoping Report indicates up to 140 wind	2027 - 2028	2028 onwards	Potential for temporal overlap of construction and operation with Proposed Development construction

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Project/Plan	Status	Distance from Array Area (km)	Distance from Export Cable Corridors	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
				turbines and up to five OSPs (CWP, 2020).			and operation and maintenance phases.
Dublin Array (formerly known as Bray and Kish Offshore Windfarms)	Proposed	25.8	24.9	Updated application expected to be made under the Maritime Area Planning Act 2021. Scoping Report indicates up to 61 wind turbines with up to 308 m tip height and indicative hub height of 165.5 m above mean high water springs (Innogy, 2020).	2028-2032	2032 onwards	Potential for temporal overlap of construction and operation with Proposed Development construction and operation and maintenance phases.
North Irish Sea Array	Early planning	65.1	64.1	Site investigation works from 2021-2026.	2027 - 2029	2029 onwards	Potential for temporal overlap of construction and operation

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Project/Plan	Status	Distance from Array Area (km)	Distance from Export Cable Corridors	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
				Foreshore licence applied for surveys from summer 2020. Planning submission targeted 2023.			with Proposed Development construction and operation and maintenance phases.
Oriel	Proposed	108.1	107.2	'Relevant Project'. Updated application expected to be made under the Maritime Area Planning Act 2021. 'Relevant Project'. Phase 1 Concept/Early Planning (MAC awarded) Foreshore licence application determined 2023.	2026-2028 (piling from 2026 – 2027)	From 2030	Potential for temporal overlap with Proposed Development construction phase.

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Project/Plan	Status	Distance from Array Area (km)	Distance from Export Cable Corridors	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
Sceirde Rocks	Proposed	264.3	254.1	'Relevant Project'. Updated application expected to be made under the Maritime Area Planning Act 2021. A 450 MW Irish offshore windfarm. MAC awarded in 2022	2026 – 2030	From 2031	Potential for temporal overlap with Proposed Development construction phase.

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Table 7.4: List of other projects and plans considered within the in-combination assessment for waders and offshore ornithology

Project/Plan	Status	Distance from Array Area (km)	Distance from offshore export cable routes (km)	Description of Project/Plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Proposed Development
Tier 1							
ABWP1	Operational	0	0.5	ABWP1, consisting of seven wind turbines at a capacity of 25.2 MW.	2003 to 2004	2004 to ongoing	Screened in due to ongoing impact. Located within the Array Area.
Rhyl Flats	Operational	156.3	155.5	Operational windfarm comprising 25 turbines	N/A	2009 – ongoing	Screened in due to ongoing impact. Located within Irish Sea with potential to contribute to impacts on regional seabird populations
Barrow Offshore Windfarm	Operational	208.6	207.6	Operational windfarm comprising 30 turbines	N/A	2006 to ongoing	Screened in due to ongoing impact. Located within Irish Sea with potential to contribute to impacts on regional seabird populations
Gwynt y Mor Offshore Windfarm	Operational	159	158.1	Operational windfarm comprising 160 turbines	N/A	2015 – ongoing	Screened in due to ongoing impact. Located within Irish Sea with potential to contribute to impacts on regional seabird populations

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Project/Plan	Status	Distance from Array Area (km)	Distance from offshore export cable routes (km)	Description of Project/Plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Proposed Development
North Hoyle	Operational	170.9	170.1	Operational windfarm comprising 30 turbines	N/A	2003 – ongoing	Screened in due to ongoing impact. Located within Irish Sea with potential to contribute to impacts on regional seabird populations
Walney Extension	Operational	187.1	186.1	Operational windfarm comprising 47 turbines	N/A	2018 – ongoing	Screened in due to ongoing impact. Located within Irish Sea with potential to contribute to impacts on regional seabird populations
Burbo Bank	Operational	189.9	189.0	Operational windfarm comprising 25 turbines	N/A	2007 – ongoing	Screened in due to ongoing impact. Located within Irish Sea with potential to contribute to impacts on regional seabird populations
Burbo Bank Extension	Operational	180.6	179.8	Operational windfarm comprising 32 turbines	N/A	2017- ongoing	Screened in due to ongoing impact. Located within Irish Sea with potential to contribute to impacts on regional seabird populations

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Project/Plan	Status	Distance from Array Area (km)	Distance from offshore export cable routes (km)	Description of Project/Plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Proposed Development
Robin Rigg Offshore Windfarm	Operational	247.3	246.3	Operational windfarm comprising 58 turbines	N/A	2010 – ongoing	Screened in due to ongoing impact. Located within Irish Sea with potential to contribute to impacts on regional seabird populations
West of Duddon Sands Offshore Windfarm	Operational	196.9	195.9	Operational windfarm comprising 108 turbines	N/A	2014 – ongoing	Screened in due to ongoing impact. Located within Irish Sea with potential to contribute to impacts on regional seabird populations
Walney Offshore Windfarm	Operational	199.1	198.1	Operational windfarm comprising 102 turbines	N/A	2010 – ongoing	Screened in due to ongoing impact. Located within Irish Sea with potential to contribute to impacts on regional seabird populations
Ormonde	Operational	207.4	206.4	Operational windfarm comprising 30 turbines	N/A	2012 – ongoing	Screened in due to ongoing impact. Located within Irish Sea with potential to contribute to impacts on regional seabird populations
Tier 2							

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Project/Plan	Status	Distance from Array Area (km)	Distance from offshore export cable routes (km)	Description of Project/Plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Proposed Development
Erebus Offshore Windfarm	Consented	133.3	132.7	Consented for up to 7 turbines	2025-2027	From 2028	Potential for overlap with Proposed Development construction and operation and maintenance phases
Awel y Mor Offshore Windfarm	Consented	148.5	147.6	Consented for up to 50 turbines	2026-2030	From 2031	Potential for overlap with Proposed Development construction and operation and maintenance phases
Twin Hub Offshore Windfarm	Consented	256.2	255.6	Floating test site with 4 turbines	2026	2027	Potential for overlap with Proposed Development construction and operation and maintenance phases.
Tier 3							
ABWP1	Decommissioning	0	0.5	ABWP1, consisting of seven wind turbines at a capacity of 25.2 MW.	2026	NA	Screened in due to potential for overlap between decommissioning of ABWP1 and construction of ABWP2.
Mona Offshore Windfarm	Proposed	146.7	145.7	English Round 4 project with up to 107 turbines	2026-2027	From 2028	Potential for overlap with Proposed Development construction and

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Project/Plan	Status	Distance from Array Area (km)	Distance from offshore export cable routes (km)	Description of Project/Plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Proposed Development
							operation and maintenance phases
Morgan Offshore Windfarm	Proposed	165.3	164.3	English Round 4 project with up to 96 turbines	2028-2029	From 2030	Potential for overlap with Proposed Development construction and operation and maintenance phases
Morecambe Offshore Windfarm	Proposed	174.2	173.3	English Round 4 project with up to 40 turbines	2026-2029	From 2030	Potential for overlap with Proposed Development construction and operation and maintenance phases
Valorous Offshore Windfarm	Proposed	141.9	141.3	Early-stage planning	2029	From 2030	Potential overlap of operation and maintenance phases.
Phase 1 Projects							
Codling Wind Park (formerly known as Codling I and Codling II)	Proposed	18.2	17.3	'Relevant Project'. Updated application expected to be made under the Marine Planning and Development Management (MPDM) regime. Scoping Report indicates up to	2026-2028	From 2029	Potential for overlap with Proposed Development construction and operation and maintenance phases.

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Project/Plan	Status	Distance from Array Area (km)	Distance from offshore export cable routes (km)	Description of Project/Plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Proposed Development
				140 wind turbines and up to five OSPs (CWP, 2020).			
Dublin Array (formerly known as Bray and Kish Offshore Windfarms)	Proposed	25.8	24.9	'Relevant Project'. Updated application expected to be made under the MPDM regime. Scoping Report indicates up to 61 wind turbines with up to 308 m tip height and indicative hub height of 165.5 m above mean high water springs (Innogy, 2020).	2028-2032	From 2033	Potential for overlap with Proposed Development construction and operation and maintenance phases.
North Irish Sea Array	Proposed	65.1	64.1	'Relevant Project'. Updated application expected to be made under the MPDM regime.	2027-2029	From 2030	Potential for overlap with Proposed Development construction and operation and maintenance phases.
Oriel Wind Park	Proposed	108.1	107.2	'Relevant Project'. Updated application expected to be	2026-2028	From 2029	Potential for overlap with Proposed Development construction and

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Project/Plan	Status	Distance from Array Area (km)	Distance from offshore export cable routes (km)	Description of Project/Plan	Dates of construction (if applicable)	Dates of operation (if applicable)	Overlap with the Proposed Development
				made under the MPDM regime.			operation and maintenance phases.

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8 Conclusions of the Stage 1 Screening Appraisal

8.1.1.1 The Stage 1 Screening Appraisal was completed in compliance with EU and Irish law and relevant European Commission and national guidelines to determine whether or not LSE on any European Site could be excluded as a result of the construction, operation and/or maintenance or decommissioning of the Proposed Development. It has determined that there is a need for an AA of the Proposed Development both alone and in-combination with other plans or projects, for the sites listed in section 8.2.

8.1.1.2 The Proposed Development is not directly connected with or necessary to the management of any European Site.

8.1.1.3 The outcome of the Stage 1 Screening Appraisal is summarised in Table 8.1 for SACs and Table 8.2 for SPAs.

8.2 Summary for SACs

8.2.1.1 From the findings of the screening stage appraisal presented, the possibility of LSE cannot be excluded for several European Sites and QIs at the screening stage, in the absence of further evaluation and analysis and/or mitigation measures. Table 8.1 presents a summary of the designated sites and features considered within this screening assessment, with a conclusion for each in terms of LSE or not in the absence of mitigation measures.

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Table 8.1: Outcome of Stage 1 Screening Appraisal for SACs (Sites and QIs where LSE can be excluded are shaded grey)

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
Buckroney-Brittas Dunes and Fen SAC	Annual vegetation of drift lines [1210]	No	Suspended sediment and accidental pollution (Habitat deterioration)
	Perennial vegetation of stony banks [1220]	No	Suspended sediment and accidental pollution (Habitat deterioration)
	Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	No	Suspended sediment and accidental pollution (Habitat deterioration)
	Embryonic shifting dunes [2110]	No	Suspended sediment and accidental pollution (Habitat deterioration)
	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]	No	Suspended sediment and accidental pollution (Habitat deterioration)
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	No	Suspended sediment and accidental pollution (Habitat deterioration)
	Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) [2150]	No	Suspended sediment and accidental pollution (Habitat deterioration)

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Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Dunes with Salix repens ssp. argentea (*Salicion arenariae*) [2170]	No	Suspended sediment and accidental pollution (Habitat deterioration)
	Humid dune slacks [2190]	No	Suspended sediment and accidental pollution (Habitat deterioration)
	Alkaline fens [7230]	Yes	No pathway of effect
Wicklow Reef SAC	Reefs [1170]	No	Suspended sediment and accidental pollution (Habitat deterioration)
Magherabeg Dunes SAC	Annual vegetation of drift lines [1210]	No	Suspended sediment and accidental pollution (Habitat deterioration)
	Embryonic shifting dunes [2110]	No	Suspended sediment and accidental pollution (Habitat deterioration)
	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]	No	Suspended sediment and accidental pollution (Habitat deterioration)
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	No	Suspended sediment and accidental pollution (Habitat deterioration)

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Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) [2150]	No	Suspended sediment and accidental pollution (Habitat deterioration)
	Petrifying springs with tufa formation (*Cratoneurion*) [7220]	Yes	No pathway of effect
Kilpatrick Sandhills SAC	Annual vegetation of drift lines [1210]	No	Suspended sediment and accidental pollution (Habitat deterioration)
	Embryonic shifting dunes [2110]	No	Suspended sediment and accidental pollution (Habitat deterioration)
	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]	No	Suspended sediment and accidental pollution (Habitat deterioration)
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	No	Suspended sediment and accidental pollution (Habitat deterioration)
	Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) [2150	No	Suspended sediment and accidental pollution (Habitat deterioration)
The Murrough Wetlands SAC	Annual vegetation of drift lines [1210]	No	Suspended sediment and accidental pollution (Habitat deterioration)

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Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Perennial vegetation of stony banks [1220]	No	Suspended sediment and accidental pollution (Habitat deterioration)
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]	No	Suspended sediment and accidental pollution (Habitat deterioration)
	Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	No	Suspended sediment and accidental pollution (Habitat deterioration)
	Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210]	Yes	No pathway of effect
	Alkaline fens [7230]	Yes	No pathway of effect
Cahore Polders and Dunes SAC	Annual vegetation of drift lines [1210]	Yes	No pathway of effect
	Embryonic shifting dunes [2110]	No	Suspended sediment and accidental pollution (Habitat deterioration)
	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]	No	Suspended sediment and accidental pollution (Habitat deterioration)

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Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	No	Suspended sediment and accidental pollution (Habitat deterioration)
	Humid dune slacks [2190]	No	Suspended sediment and accidental pollution (Habitat deterioration)
Bray Head SAC	Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	Yes	No pathway of effect
	European dry heaths [4030]	Yes	No pathway of effect
Kilmuckridge-Tinnaberna Sandhills SAC	Embryonic shifting dunes [2110]	Yes	No pathway of effect
	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]	Yes	No pathway of effect
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	Yes	No pathway of effect
Slaney River Valley SAC	Estuaries [1130]	Yes	No pathway of effect
	Mudflats and sandflats not covered by seawater at low tide [1140]	Yes	No pathway of effect
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]	Yes	No pathway of effect

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Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	Yes	No pathway of effect
	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	Yes	No pathway of effect
	Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	Yes	No pathway of effect
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae)* [91E0]	Yes	No pathway of effect
	Freshwater pearl mussel (*Margaritifera margaritifera*) [1029]	No	Risk of disturbance or displacement to host species (Atlantic salmon)
	Sea lamprey (*Petromyzon marinus*) [1095]	No	Underwater noise and EMF
	Brook lamprey (*Lampetra planeri*) [1096]	Yes	No pathway of effect
	River lamprey (*Lampetra fluviatilis*) [1099]	No	Underwater noise and EMF
	Twaite shad (*Alosa fallax*) [1103]	No	Underwater noise and EMF
	Salmon (*Salmo salar*) [1106]	No	Underwater noise and EMF
	Otter (*Lutra lutra*) [1355]	Yes	No pathway of effect

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Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Harbour seal (*Phoca vitulina*) [1365]	No	Underwater noise, Collision Risk, Accidental pollution, Changes in prey
Rockabill to Dalkey Island SAC	Reefs [1170]	Yes	No pathway of effect
	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Blackwater Bank SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Howth Head SAC	Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	Yes	No pathway of effect
	European dry heaths [4030]	Yes	No pathway of effect
Long Bank SAC	Sandbanks which are slightly covered by sea water all the time [1110]	Yes	No pathway of effect
Raven Point Nature Reserve SAC	Annual vegetation of drift lines [1210]	Yes	No pathway of effect
	Mudflats and sandflats not covered by seawater at low tide [1140]	Yes	No pathway of effect
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]	Yes	No pathway of effect

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Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Embryonic shifting dunes [2110]	Yes	No pathway of effect
	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]	Yes	No pathway of effect
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	Yes	No pathway of effect
	Dunes with Salix repens ssp. argentea (*Salicion arenariae*) [2170]	Yes	No pathway of effect
	Humid dune slacks [2190]	Yes	No pathway of effect
West Wales Marine / Gorllewin Cymru Forol SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
River Barrow and River Nore SAC	Estuaries [1130]	Yes	No pathway of effect
	Mudflats and sandflats not covered by seawater at low tide [1140]	Yes	No pathway of effect
	Reefs [1170]	Yes	No pathway of effect
	Salicornia and other annuals colonising mud and sand [1310]	Yes	No pathway of effect
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]	Yes	No pathway of effect

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Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	Yes	No pathway of effect
	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	Yes	No pathway of effect
	European dry heaths [4030]	Yes	No pathway of effect
	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]	Yes	No pathway of effect
	Petrifying springs with tufa formation (*Cratoneurion*) [7220]	Yes	No pathway of effect
	Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	Yes	No pathway of effect
	Alluvial forests with *Alnus glutinosa* and Fraxinus excelsior (*Alno-Padion*, *Alnion incanae, Salicion albae*) [91E0]	Yes	No pathway of effect
	Desmoulin's whorl snail (*Vertigo moulinsiana*) [1016]	Yes	No pathway of effect
	Freshwater pearl mussel (*Margaritifera margaritifera*) [1029]	No	Risk of disturbance or displacement to host species (Atlantic salmon)
	White-clawed crayfish (*Austropotamobius pallipes*) [1092]	Yes	No pathway of effect

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Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Sea lamprey (*Petromyzon marinus*) [1095]	No	Underwater noise and EMF
	Brook lamprey (*Lampetra planeri*) [1096]	Yes	No pathway of effect
	River lamprey (*Lampetra fluviatilis*) [1099]	No	Underwater noise and EMF
	Twaite shad (*Alosa fallax*) [1103]	No	Underwater noise and EMF
	Salmon (*Salmo salar*) [1106]	No	Underwater noise and EMF
	Otter (*Lutra lutra*) [1355]	Yes	No pathway of effect
	Killarney fern (*Trichomanes speciosum*) [1421]	Yes	No pathway of effect
	Nore pearl mussel (*Margaritifera durrovensis*) [1990]	Yes	No pathway of effect
North Anglesey Marine / Gogledd Môn Forol SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Lambay Island SAC	Reefs [1170]	Yes	No pathway of effect
	Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	Yes	No pathway of effect

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Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Grey seal (*Halichoerus grypus*) [1364]	No	Underwater noise, Collision Risk, Accidental pollution, Changes in prey
	Harbour seal (*Phoca vitulina*) [1365]	Yes	No potential for LSE based on distance from source of potential effect.
	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Saltee Islands SAC	Mudflats and sandflats not covered by seawater at low tide [1140]	Yes	No pathway of effect
	Large shallow inlets and bays [1160]	Yes	No pathway of effect
	Reefs [1170]	Yes	No pathway of effect
	Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	Yes	No pathway of effect
	Submerged or partially submerged sea caves [8330]	Yes	No pathway of effect
	Grey seal (*Halichoerus grypus*) [1364]	No	Underwater noise, Collision Risk, Accidental pollution and Changes to prey

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Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
South Dublin Bay SAC (also Sandymount Strand/Tolka Estuary Ramsar site)	Mudflats and sandflats not covered by seawater at low tide [1140]	Yes	No pathway of effect
	Annual vegetation of drift lines [1210]	Yes	No pathway of effect
	Salicornia and other annuals colonizing mud and sand [1310]	Yes	No pathway of effect
	Embryonic shifting dunes [2110]	Yes	No pathway of effect
Codling Fault Zone SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
	Submarine structures made by leaking gases [1180]	Yes	No pathway of effect
North Dublin Bay SAC	Mudflats and sandflats not covered by seawater at low tide [1140]	Yes	No pathway of effect
	Annual vegetation of drift lines [1210]	Yes	No pathway of effect
	Salicornia and other annuals colonising mud and sand [1310]	Yes	No pathway of effect
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]	Yes	No pathway of effect
	Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	Yes	No pathway of effect

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Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Embryonic shifting dunes [2110]	Yes	No pathway of effect
	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]	Yes	No pathway of effect
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	Yes	No pathway of effect
	Humid dune slacks [2190]	Yes	No pathway of effect
	Petalwor (*Petalophyllum ralfsii*) [1395]	Yes	No pathway of effect
Pen Llyn a`r Sarnau/ Lleyn Peninsula and the Sarnau SAC	Sandbanks which are slightly covered by sea water all the time [1110]	Yes	No pathway of effect
	Estuaries [1130]	Yes	No pathway of effect
	Coastal lagoons [1150]	Yes	No pathway of effect
	Large shallow inlets and bays [1160]	Yes	No pathway of effect
	Reefs [1170]	Yes	No pathway of effect
	Mudflats and sandflats not covered by seawater at low tide [1140]	Yes	No pathway of effect
	Salicornia and other annuals colonizing mud and sand [1310]	Yes	No pathway of effect

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Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]	Yes	No pathway of effect
	Submerged or partially submerged sea caves [8330]	Yes	No pathway of effect
	Grey seal (*Halichoerus grypus*) [1364]	No	Underwater noise, Collision Risk, Accidental pollution, Changes in prey
	Bottlenose dolphin (*Tursiops truncatus*) [1349]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
	Otter (*Lutra lutra*) [1355]	Yes	No pathway of effect
Carnsore Point SAC (IR)	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Lower River Suir SAC	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]	Yes	No pathway of effect
	Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	Yes	No pathway of effect
	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]	Yes	No pathway of effect

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Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]	Yes	No pathway of effect
	Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	Yes	No pathway of effect
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae)* [91E0]	Yes	No pathway of effect
	Taxus baccata woods of the British Isles [91J0]	Yes	No pathway of effect
	Fresh water pearl mussel (*Margaritifera margaritifera)* [1029]	No	Risk of disturbance or displacement to host species (Atlantic salmon)
	White-clawed crayfish (*Austropotamobius pallipes*) [1092]	Yes	No pathway of effect
	Sea lamprey (*Petromyzon marinus*) [1095]	No	Underwater noise and EMF
	Brook lamprey (*Lampetra planeri*) [1096]	Yes	No pathway of effect
	River lamprey (*Lampetra fluviatilis*) [1099]	No	Underwater noise and EMF
	Twaite shad (*Alosa fallax*) [1103]	No	Underwater noise and EMF
	Salmon (*Salmo salar*) [1106]	No	Underwater noise and EMF

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Otter (*Lutra lutra*) [1355]	Yes	No pathway of effect
Cardigan Bay/ Bae Ceredigion SAC	Sandbanks which are slightly covered by sea water all the time [1110]	Yes	No pathway of effect
	Reefs [1170]	Yes	No pathway of effect
	Submerged or partially submerged sea caves [8330]	Yes	No pathway of effect
	Sea lamprey *(Petromyzon marinus*) [1095]	Yes	No pathway of effect
	River lamprey (*Lampetra fluviatilis*) [1099]	Yes	No pathway of effect
	Bottlenose dolphin (*Tursiops truncatus*) [1349]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
	Grey seal (*Halichoerus grypus*) [1364]	No	Underwater noise, Collision Risk, Accidental pollution, Changes in prey
Pembrokeshire Marine/ Sir Benfro Forol	Estuaries [1130]	Yes	No pathway of effect
	Large shallow inlets and bays [1160]	Yes	No pathway of effect
	Reefs [1170]	Yes	No pathway of effect

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Sandbanks which are slightly covered by sea water all the time [1110]	Yes	No pathway of effect
	Mudflats and sandflats not covered by seawater at low tide [1140]	Yes	No pathway of effect
	Coastal lagoons [1150]	Yes	No pathway of effect
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]	Yes	No pathway of effect
	Submerged or partially submerged sea caves [8330]	Yes	No pathway of effect
	Grey seal (*Halichoerus grypus*) [1364]	Yes	No pathway of effect
	Shore dock (*Rumex rupestris*) [1441]	Yes	No pathway of effect
	Sea lamprey (*Petromyzon marinus*) [1095]	Yes	No pathway of effect
	River lamprey (*Lampetra fluviatilis*) [1099]	Yes	No pathway of effect
	Allis shad (*Alosa alosa*) [1102]	Yes	No pathway of effect
	Twaite shad (*Alosa fallax*) [1103]	Yes	No pathway of effect
	Otter (*Lutra lutra*) [1355]	Yes	No pathway of effect

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
River Boyne and River Blackwater SAC	Alkaline fens [7230]	Yes	No pathway of effect
	Alluvial forests with *Alnus glutinosa* and Fraxinus excelsior (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]	Yes	No pathway of effect
	River Lamprey (*Lampetra fluviatilis*) [1099]	No	Underwater noise and EMF
	Salmon (*Salmo salar*) [1106]	No	Underwater noise and EMF
	Otter (*Lutra lutra*) [1355]	Yes	No pathway of effect
Hook Head SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
	Bottlenose dolphin (*Tursiops truncatus*) [1349]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Bristol Channel Approaches / Dynesfeydd Môr Hafren SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
North Channel SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
Roaringwater Bay and Islands SAC	Large shallow inlets and bays [1160]	Yes	No pathway of effect
	Reefs [1170]	Yes	No pathway of effect
	Vegetated sea cliffs of the Atlantic and Baltic coats [1230]	Yes	No pathway of effect
	European dry heaths [4030]	Yes	No pathway of effect
	Submerged or partially submerged sea caves [8330]	Yes	No pathway of effect
	Harbour porpoise *(Phocoena phocoena)* [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
	Otter *(Lutra lutra)* [1355]	Yes	No pathway of effect
	Grey seal (*Halichoerus grypus*) [1364]	Yes	No potential for LSE based on significant distance from source of potential effect.
Horn Head and Rinclevan SAC	Embryonic shifting dunes [2110]	Yes	No pathway of effect
	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]	Yes	No pathway of effect
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	Yes	No pathway of effect

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Dunes with *Salix repens* spp. *argentea* (*Salicion arenariae*) [2170]	Yes	No pathway of effect
	Humid dune slacks [2190]	Yes	No pathway of effect
	Machairs (* in Ireland) [21A0]	Yes	No pathway of effect
	Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or Isoeto-Nanojuncetea [3130]	Yes	No pathway of effect
	Geyer's Whorl Snail (*Vertigo geyeri*) [1013]	Yes	No pathway of effect
	Grey Seal *(Halichoerus grypus)* [1364]	Yes	No potential for LSE based on significant distance from source of potential effect.
	Petalwort (Petalophyllum ralfsii) [1395]	Yes	No pathway of effect
	Slender Naiad (*Najas flexilis*) [1833]	Yes	No pathway of effect
South-East Islay Skerries SAC	Harbour seal (*Phoca vitulina*) [1365]	Yes	No potential for LSE based on significant distance from source of potential effect.
Deputy's Pass Nature Reserve SAC	Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]	Yes	No pathway of effect

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
Blasket Islands SAC	Reefs [1170]	Yes	No pathway of effect
	Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	Yes	No pathway of effect
	European dry heaths [4030]	Yes	No pathway of effect
	Submerged or partially submerged sea caves [8330]	Yes	No pathway of effect
	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
	Grey seal (*Halichoerus grypus*) [1364]	Yes	No potential for LSE based on significant distance from source of potential effect.
Treshnish Isles SAC	Reefs [1170]	Yes	No pathway of effect
	Grey seal (*Halichoerus grypus*) [1364]	Yes	No potential for LSE based on significant distance from source of potential effect.
Kenmare River SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
Nord Bretagne DH	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Tregor Goëlo SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Récifs et landes de la Hague (FR) SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Chausey SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Anse de Vauville (FR) SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Mers Celtiques - Talus du golfe de Gascogne (FR) SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Banc et récifs de Surtainville (FR) SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
Baie de Morlaix SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Abers - Côtes des legends SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Ouessant-Molène SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Belgica Mound Province SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
	Bottlenose dolphin (*Tursiops truncatus*) [1349]	Yes	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Cap d'Erquy-Cap Fréhel SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Côte de Granit rose-Sept-Iles SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
Côtes de Crozon SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Baie de Saint-Brieuc – Est SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Chaussée de Sein SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Baie de Lancieux, Baie de l'Arguenon, Archipel de Saint Malo et Dinard SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Baie du Mont Saint-Michel SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Estuaire de la Rance SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Bunduff Lough and Machair / Trawalua / Mullaghmore SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
Inishmore Island SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
Kilkieran Bay and Islands SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey
West Connacht Coast SAC	Harbour porpoise (*Phocoena phocoena*) [1351]	No	Underwater noise, Collision Risk, Accidental pollution, EMF, Changes in prey

Searchable

8.3 Summary for SPAs

8.3.1.1 From the findings of the screening stage appraisal presented, the possibility of LSE cannot be excluded for the following European Sites and SCIs at the screening stage, in the absence of further evaluation and analysis and/or mitigation measures.

- Kittiwake
  - Wicklow Head SPA;
  - Howth Head Coast SPA;
  - Ireland's Eye SPA;
  - Lambay Island SPA; and
  - Saltee Islands SPA.
- Herring gull
  - Ireland's Eye SPA;
  - Lambay Island SPA;
  - Skerries Island SPA; and
  - Saltee Islands SPA.
- Guillemot
  - Ireland's Eye SPA;
  - Lambay Island SPA; and
  - Saltee Islands SPA.
- Razorbill
  - Ireland's Eye SPA;
  - Lambay Island SPA; and
  - Saltee Islands SPA.
- Lesser black-backed gull
  - Lambay Island SPA;
  - Saltee Islands SPA.
- Gannet
  - Saltee Islands SPA.

8.3.1.2 It can be excluded, on the basis of objective information, that the Proposed Development will likely have a significant effect on the remaining SPA sites considered, and as summarised in Table 8.2. That is the case in the absence of mitigation measures.

Searchable

Table 8.2: Outcome of Stage 1 Screening Appraisal for SPAs (Sites and QIs where LSE can be excluded are shaded grey)

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
Aberdaron Coast and Bardsey Island / Glannau Aberdaron and Ynys Enlli SPA	Manx shearwater (*Puffinus puffinus*) [A013]	Yes	No risk of collision. Low risk of displacement
	Chough (*Pyrrhocorax pyrrhocorax*) [A346]	Yes	No pathway of effect
Anglesey Terns / Morwenoliaid Ynys Môn SPA	Arctic tern (*Sterna paradisaea*) [A194]	Yes	Low risk of collision or displacement
	Common tern (*Sterna hirundo*) [A193]	Yes	Low risk of collision or displacement
	Roseate tern (*Sterna dougallii*) [A192]	Yes	Low risk of collision or displacement
	Sandwich tern (*Thalasseus sandvicensis*) [A191]	Yes	Low risk of collision or displacement
Baldoyle Bay SPA	Light-bellied brent goose (*Branta bernicla hrota*) [A046]	Yes	Low risk of collision or displacement
	Shelduck (*Tadorna tadorna*) [A048]	Yes	Low risk of collision or displacement
	Ringed plover (*Charadrius hiaticula*) [A137]	Yes	Low risk of collision or displacement
	Golden plover (*Pluvialis apricaria*) [A140]	Yes	Low risk of collision or displacement
	Grey plover (*Pluvialis squatarola*) [A141]	Yes	Low risk of collision or displacement

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Bar-tailed godwit (*Limosa lapponica*) [A157]	Yes	Low risk of collision or displacement
	Wetland and waterbirds [A999]	Yes	Low risk of collision or displacement
Ballyteige Burrow SPA	Light-bellied brent goose (*Branta bernicla hrota*) [A046]	Yes	Low risk of collision or displacement
	Shelduck (*Tadorna tadorna*) [A048]	Yes	Low risk of collision or displacement
	Golden plover (*Pluvialis apricaria*) [A140]	Yes	Low risk of collision or displacement
	Grey plover (*Pluvialis squatarola*) [A141]	Yes	Low risk of collision or displacement
	Lapwing (*Vanellus vanellus*) [A142]	Yes	Low risk of collision or displacement
	Black-tailed godwit (*Limosa limosa*) [A156]	Yes	Low risk of collision or displacement
	Bar-tailed godwit (*Limosa lapponica*) [A157]	Yes	Low risk of collision or displacement
	Wetland and waterbirds [A999]	Yes	Low risk of collision or displacement
Bannow Bay SPA	Light-bellied brent goose (*Branta bernicla hrota*) [A046]	Yes	Low risk of collision or displacement

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Shelduck (*Tadorna tadorna*) [A048]	Yes	Low risk of collision or displacement
	Pintail (*Anas acuta*) [A054]	Yes	Low risk of collision or displacement
	Oystercatcher (*Haematopus ostralegus*) [A130]	Yes	Low risk of collision or displacement
	Golden plover (*Pluvialis apricaria*) [A140]	Yes	Low risk of collision or displacement
	Grey plover (*Pluvialis squatarola*) [A141]	Yes	Low risk of collision or displacement
	Lapwing (*Vanellus vanellus*) [A142]	Yes	Low risk of collision or displacement
	Knot (*Calidris canutus*) [A143]	Yes	Low risk of collision or displacement
	Dunlin (*Calidris alpina)* [A149]	Yes	Low risk of collision or displacement
	Black-tailed godwit (*Limosa limosa*) [A156]	Yes	Low risk of collision or displacement
	Bar-tailed godwit (*Limosa lapponica*) [A157]	Yes	Low risk of collision or displacement
	Curlew (*Numenius arquata*) [A160]	Yes	Low risk of collision or displacement

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Redshank (*Tringa totanus*) [A162]	Yes	Low risk of collision or displacement
	Wetland and Waterbirds [A999]	Yes	Low risk of collision or displacement
Boyne Estuary SPA	Little tern (*Sterna albifrons*) [A195]	Yes	Low risk of collision or displacement
	Arctic tern (*Sterna paradisaea*) [A194]	Yes	Low risk of collision or displacement
	Shelduck (*Tadorna tadorna*) [A048]	Yes	Low risk of collision or displacement
	Oystercatcher (*Haematopus ostralegus*) [A130]	Yes	Low risk of collision or displacement
	Golden plover (*Pluvialis apricaria*) [A140]	Yes	Low risk of collision or displacement
	Grey plover (*Pluvialis squatarola*) [A141]	Yes	Low risk of collision or displacement
	Lapwing (*Vanellus vanellus*) [A142]	Yes	Low risk of collision or displacement
	Knot (*Calidris canutus*) [A143]	Yes	Low risk of collision or displacement
	Sanderling (*Calidris alba*) [A144]	Yes	Low risk of collision or displacement

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Black-tailed godwit (*Limosa limosa*) [A156]	Yes	Low risk of collision or displacement
	Redshank (*Tringa totanus*) [A162]	Yes	Low risk of collision or displacement
	Turnstone (*Arenaria interpres*) [A169]	Yes	Low risk of collision or displacement
	Little tern (*Sterna albifrons*) [A195]	Yes	Low risk of collision or displacement
	Wetland and Waterbirds [A999]	Yes	Low risk of collision or displacement
Cahore Marshes SPA	Wigeon (*Anas penelope*) [A050]	Yes	Low risk of collision or displacement
	Golden Plover (*Pluvialis apricaria*) [A140]	Yes	Low risk of collision or displacement
	Lapwing (*Vanellus vanellus*) [A142]	Yes	Low risk of collision or displacement
	Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395]	Yes	Low risk of collision or displacement
	Wetland and Waterbirds [A999]	Yes	Low risk of collision or displacement
Dalkey Islands SPA	Arctic tern (*Sterna paradisaea*) [A194]	Yes	Low risk of collision or displacement

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Common tern (*Sterna hirundo*) [A193]	Yes	Low risk of collision or displacement
	Roseate tern (*Sterna dougallii*) [A192]	Yes	Low risk of collision or displacement
Grassholm SPA	Gannet (*Morus bassanus*) [A016]	Yes	Low risk of collision. No risk of displacement
Howth Head Coast SPA	Kittiwake (*Rissa tridactyla*) [A188]	No	Risk of collision. No risk of displacement
Ireland's Eye SPA	Cormorant (*Phalacrocorax carbo*) [A017]	Yes	No risk of collision or displacement
	Guillemot (*Uria aalge*) [A199]	No	Risk of displacement. No risk of collision.
	Herring gull (*Larus argentatus*) [A184]	No	Risk of collision. No risk of displacement
	Kittiwake (*Rissa tridactyla*) [A188]	No	Risk of collision. No risk of displacement
	Razorbill (*Alca torda*) [A200]	No	Risk of displacement. No risk of collision.
Irish Sea Front SPA	Manx shearwater (*Puffinus puffinus*) [A013]	Yes	No risk of collision. Low risk of displacement
Keeragh Islands SPA	Cormorant (*Phalacrocorax carbo*) [A017]	Yes	No risk of collision or displacement

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
Lady's Island Lake SPA	Arctic tern (*Sterna paradisaea*) [A194]	Yes	Low risk of collision or displacement
	Black-headed gull (*Chroicocephalus ridibundus*) [A156]	Yes	Low risk of collision or displacement
	Common tern (*Sterna hirundo*) [A193]	Yes	Low risk of collision or displacement
	Roseate tern (*Sterna dougallii*) [A192]	Yes	Low risk of collision or displacement
	Sandwich tern (*Thalasseus sandvicensis*) [A191]	Yes	Low risk of collision or displacement
	Gadwall (*Anas strepera*) [A051]	Yes	Low risk of collision or displacement
	Wetland and Waterbirds [A999]	Yes	Low risk of collision or displacement
Lambay Island SPA	Cormorant (*Phalacrocorax carbo*) [A017]	Yes	No risk of collision or displacement
	Fulmar (*Fulmarus glacialis*) [A009]	Yes	Low risk of collision. No risk of displacement
	Guillemot (*Uria aalge*) [A199]	No	Risk of displacement. No risk of collision.
	Herring gull (*Larus argentatus*) [A184]	No	Risk of collision. No risk of displacement

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Kittiwake (*Rissa tridactyla*) [A188]	No	Risk of collision. No risk of displacement
	Lesser black-backed gull (*Larus fuscus*) [A183]	No	Risk of collision. No risk of displacement
	Puffin (*Fratercula arctica*) [A204]	Yes	Very low abundance hence virtually no risk of displacement. No risk of collision.
	Razorbill (*Alca torda*) [A200]	No	Risk of displacement. No risk of collision.
	Shag (*Phalacrocorax aristotelis*) [A018]	Yes	No risk of collision or displacement
	Greylag goose (*Anser anser*) [A043]	Yes	No risk of collision or displacement
Malahide Estuary	Great crested grebe (*Podiceps cristatus*) [A005]	Yes	Low risk of collision or displacement
	Light-bellied brent goose (*Branta bernicla hrota*) [A046]	Yes	Low risk of collision or displacement
	Shelduck (*Tadorna tadorna*) [A048]	Yes	Low risk of collision or displacement
	Pintail (*Anas acuta*) [A054]	Yes	Low risk of collision or displacement

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Goldeneye (*Bucephala clangula*) [A067]	Yes	Low risk of collision or displacement
	Red-breasted merganser (*Mergus serrator*) [A069]	Yes	Low risk of collision or displacement
	Oystercatcher (*Haematopus ostralegus*) [A130]	Yes	Low risk of collision or displacement
	Golden plover (*Pluvialis apricaria*) [A140]	Yes	Low risk of collision or displacement
	Grey plover (*Pluvialis squatarola*) [A141]	Yes	Low risk of collision or displacement
	Knot (*Calidris canutus*) [A143]	Yes	Low risk of collision or displacement
	Dunlin (*Calidris alpina*) [A149]	Yes	Low risk of collision or displacement
	Black-tailed godwit (*Limosa limosa*) [A156]	Yes	Low risk of collision or displacement
	Bar-tailed godwit (*Limosa lapponica*) [A157]	Yes	Low risk of collision or displacement
	Redshank (*Tringa totanus*) [A162]	Yes	Low risk of collision or displacement
	Wetland and waterbirds [A999]	Yes	Low risk of collision or displacement

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
North Bull Island SPA	Light-bellied brent goose (*Branta bernicla hrota*) [A046]	Yes	Low risk of collision or displacement
	Shelduck (*Tadorna tadorna*) [A048]	Yes	Low risk of collision or displacement
	Teal (*Anas crecca*) [A052]	Yes	Low risk of collision or displacement
	Pintail (*Anas acuta*) [A054]	Yes	Low risk of collision or displacement
	Shoveler (*Anas clypeata*) [A056]	Yes	Low risk of collision or displacement
	Oystercatcher (*Haematopus ostralegus*) [A130]	Yes	Low risk of collision or displacement
	Golden plover (*Pluvialis apricaria*) [A140]	Yes	Low risk of collision or displacement
	Grey plover (*Pluvialis squatarola*) [A141]	Yes	Low risk of collision or displacement
	Knot (*Calidris canutus*) [A143]	Yes	Low risk of collision or displacement
	Sanderling (*Calidris alba*) [A144]	Yes	Low risk of collision or displacement
	Dunlin (*Calidris alpina*) [A149]	Yes	Low risk of collision or displacement

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Black-tailed godwit (*Limosa limosa*) [A156]	Yes	Low risk of collision or displacement
	Bar-tailed godwit (*Limosa lapponica*) [A157]	Yes	Low risk of collision or displacement
	Curlew (*Numenius arquata*) [A160]	Yes	Low risk of collision or displacement
	Redshank (*Tringa totanus*) [A162]	Yes	Low risk of collision or displacement
	Turnstone (*Arenaria interpres*) [A169]	Yes	Low risk of collision or displacement
	Black-headed gull (*Chroicocephalus ridibundus*) [A179]	Yes	Low risk of collision or displacement
	Wetland and waterbirds [A999]	Yes	Low risk of collision or displacement
Northern Cardigan Bay / Gogledd Bae Ceredigion SPA	Red-throated diver (*Gavia stellata*) [A001]	Yes	Low risk of collision or displacement
River Nanny Estuary and Shore SPA	Oystercatcher (*Haematopus ostralegus*) [A130]	Yes	Low risk of collision or displacement
	Ringed plover (*Charadrius hiaticula*) [A137]	Yes	Low risk of collision or displacement
	Golden plover (*Pluvialis apricaria*) [A140]	Yes	Low risk of collision or displacement

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Knot (*Calidris canutus*) [A143]	Yes	Low risk of collision or displacement
	Sanderling (*Calidris alba*) [A144]	Yes	Low risk of collision or displacement
	Herring gull (*Larus argentatus*) [A184]	Yes	Low risk of collision or displacement
	Wetland and waterbirds [A999]	Yes	Low risk of collision or displacement
Rockabill SPA	Arctic tern (*Sterna paradisaea*) [A194]	Yes	Low risk of collision or displacement
	Common tern (*Sterna hirundo*) [A193]	Yes	Low risk of collision or displacement
	Roseate tern (*Sterna dougallii*) [A192]	Yes	Low risk of collision or displacement
	Purple sandpiper (*Calidris maritima*) [A148]	Yes	Low risk of collision and negligible impact from displacement
Rogerstown Estuary SPA	Greylag goose (*Anser anser*) [A043]	Yes	Low risk of collision or displacement
	Light-bellied brent goose (*Branta bernicla hrota*) [A046]	Yes	Low risk of collision or displacement
	Shelduck (*Tadorna tadorna*) [A048]	Yes	Low risk of collision or displacement

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Shoveler (*Anas clypeata*) [A056]	Yes	Low risk of collision or displacement
	Oystercatcher (*Haematopus ostralegus*) [A130]	Yes	Low risk of collision or displacement
	Ringed plover (*Charadrius hiaticula*) [A137]	Yes	Low risk of collision or displacement
	Grey plover (*Pluvialis squatarola*) [A141]	Yes	Low risk of collision or displacement
	Knot (*Calidris canutus) [A143]*	Yes	Low risk of collision or displacement
	Dunlin *(Calidris alpina*) [A149]	Yes	Low risk of collision or displacement
	Black-tailed godwit (*Limosa limosa*) [A156]	Yes	Low risk of collision or displacement
	Redshank (*Tringa totanus*) [A162]	Yes	Low risk of collision or displacement
	Wetland and Waterbirds [A999]	Yes	Low risk of collision or displacement
Saltee Islands SPA	Cormorant (*Phalacrocorax carbo*) [A017]	Yes	No risk of collision or displacement
	Fulmar (*Fulmarus glacialis*) [A009]	Yes	Low risk of collision. No risk of displacement

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Gannet (*Morus bassanus*) [A016]	No	Risk of collision. No risk of displacement
	Guillemot (*Uria aalge*) [A199]	No	Risk of displacement. No risk of collision.
	Herring gull (*Larus argentatus*) [A184]	No	Risk of collision. No risk of displacement
	Kittiwake (*Rissa tridactyla*) [A188]	No	Risk of collision. No risk of displacement
	Lesser black-backed gull (*Larus fuscus*) [A183]	No	Risk of collision. No risk of displacement
	Puffin (*Fratercula arctica*) [A204]	Yes	Very low abundance hence virtually no risk of displacement. No risk of collision.
	Razorbill (*Alca torda*) [A200]	No	Risk of displacement. No risk of collision.
	Shag (*Phalacrocorax aristotelis*) [A018]	Yes	No risk of collision or displacement
Seas off Wexford SPA	Red-throated Diver (*Gavia stellata*) [A001]	Yes	No risk of collision or displacement
	Fulmar (*Fulmarus glacialis*) [A009]	Yes	No risk of collision or displacement

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Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Manx Shearwater (*Puffinus puffinus*) [A013]	Yes	No risk of collision or displacement
	Gannet (*Morus bassanus*) [A016]	Yes	No risk of collision or displacement
	Cormorant (*Phalacrocorax carbo*) [A017]	Yes	No risk of collision or displacement
	Shag (*Phalacrocorax aristotelis*) [A018]	Yes	No risk of collision or displacement
	Common Scoter (*Melanitta nigra*) [A065]	Yes	No risk of collision or displacement
	Mediterranean Gull (*Larus melanocephalus*) [A176]	Yes	No risk of collision or displacement
	Black-headed Gull (*Chroicocephalus ridibundus*) [A179]	Yes	No risk of collision or displacement
	Lesser Black-backed Gull (*Larus fuscus*) [A183]	Yes	No risk of collision or displacement
	Herring Gull (*Larus argentatus*) [A184]	Yes	No risk of collision or displacement
	Kittiwake (*Rissa tridactyla*) [A188]	Yes	No risk of collision or displacement
	Sandwich Tern (*Sterna sandvicensis*) [A191]	Yes	No risk of collision or displacement

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Roseate Tern (*Sterna dougallii*) [A192]	Yes	No risk of collision or displacement
	Common Tern (*Sterna hirundo*) [A193]	Yes	No risk of collision or displacement
	Arctic Tern (*Sterna paradisaea*) [A194]	Yes	No risk of collision or displacement
	Little Tern (*Sterna albifrons*) [A195]	Yes	No risk of collision or displacement
	Guillemot (*Uria aalge*) [A199]	Yes	No risk of collision or displacement
	Razorbill (*Alca torda*) [A200]	Yes	No risk of collision or displacement
	Puffin (*Fratercula arctica*) [A204]	Yes	No risk of collision or displacement
Skerries Island SPA	Cormorant (*Phalacrocorax carbo*) [A017]	Yes	No risk of collision or displacement
	Herring gull (*Larus argentatus*) [A184]	No	Risk of collision. No risk of displacement
	Shag (*Phalacrocorax aristotelis*) [A018]	Yes	No risk of collision or displacement
	Light-bellied brent goose (*Branta bernicla hrota*) [A046]	Yes	Low risk of collision or displacement

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Purple sandpiper (*Calidris maritima*) [A148]	Yes	Low risk of collision or displacement
	Turnstone (*Arenaria interpres*) [A169]	Yes	Low risk of collision or displacement
South Dublin Bay and River Tolka Estuary SPA / Ramsar	Arctic tern (*Sterna paradisaea*) [A194]	Yes	Low risk of collision or displacement
	Black-headed gull (*Chroicocephalus ridibundus*) [A156]	Yes	Low risk of collision. No risk of displacement
	Common tern (*Sterna hirundo*) [A193]	Yes	Low risk of collision or displacement
	Roseate tern (*Sterna dougallii*) [A192]	Yes	Low risk of collision or displacement
	Light-bellied brent goose (*Branta bernicla hrota*) [A046]	Yes	Low risk of collision or displacement
	Oystercatcher (*Haematopus ostralegus*) [A130]	Yes	Low risk of collision or displacement
	Ringed plover (*Charadrius hiaticula*) [A137]	Yes	Low risk of collision or displacement
	Grey plover (*Pluvialis squatarola*) [A141]	Yes	Low risk of collision or displacement
	Knot (*Calidris canutus*) [A143]	Yes	Low risk of collision or displacement

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Sanderling (*Calidris alba*) [A144]	Yes	Low risk of collision or displacement
	Dunlin (*Calidris alpina*) [A149]	Yes	Low risk of collision or displacement
	Bar-tailed godwit (*Limosa lapponica*) [A157]	Yes	Low risk of collision or displacement
	Redshank (*Tringa totanus*) [A162]	Yes	Low risk of collision or displacement
	Wetland and waterbirds [A999]	Yes	Low risk of collision or displacement
Tacumshin Lake SPA	Little grebe (*Tachybaptus ruficollis*) [A004]	Yes	Low risk of collision or displacement
	Bewick's swan (*Cygnus columbianus bewickii*) [A037]	Yes	Low risk of collision or displacement
	Whooper swan (*Cygnus cygnus*) [A038]	Yes	Low risk of collision or displacement
	Wigeon (*Anas penelope*) [A050]	Yes	Low risk of collision or displacement
	Gadwall (*Anas strepera*) [A051]	Yes	Low risk of collision or displacement
	Teal (*Anas crecca*) [A052]	Yes	Low risk of collision or displacement

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Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Pintail (*Anas acuta*) [A054]	Yes	Low risk of collision or displacement
	Shoveler (*Anas clypeata*) [A056]	Yes	Low risk of collision or displacement
	Tufted duck (*Aythya fuligula*) [A061]	Yes	Low risk of collision or displacement
	Coot (*Fulica atra*) [A125]	Yes	Low risk of collision or displacement
	Golden plover (*Pluvialis apricaria*) [A140]	Yes	Low risk of collision or displacement
	Grey plover (*Pluvialis squatarola*) [A141]	Yes	Low risk of collision or displacement
	Lapwing (*Vanellus vanellus*) [A142]	Yes	Low risk of collision or displacement
	Black-tailed godwit (*Limosa limosa*) [A156]	Yes	Low risk of collision or displacement
	Wetland and waterbirds [A999]	Yes	Low risk of collision or displacement
The Murrough SPA	Black-headed gull (*Chroicocephalus ridibundus*) [A156]	Yes	Low risk of collision. No risk of displacement
	Herring gull (*Larus argentatus*) [A184]	Yes	Low risk of collision. No risk of displacement

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Little tern (*Sterna albifrons*) [A195]	Yes	Low risk of collision or displacement
	Red-throated diver (*Gavia stellata*) [A001]	Yes	Low risk of collision or displacement
	Greylag goose (*answer answer*) [A043]	Yes	Low risk of collision or displacement
	Light-bellied brent goose (*Branta bernicla hrota*) [A046]	Yes	Low risk of collision or displacement
	Wigeon (*Anas penelope*) [A050]	Yes	Low risk of collision or displacement
	Teal (*Anas crecca*) [A052]	Yes	Low risk of collision or displacement
The Raven SPA	Cormorant (*Phalacrocorax carbo*) [A017]	Yes	No risk of collision or displacement
	Red-throated diver (*Gavia stellata*) [A001]	Yes	Low risk of collision or displacement
	Common scoter (*Melanitta nigra*) [A065]	Yes	Low risk of collision or displacement
	Grey plover (*Pluvialis squatarola*) [A141]	Yes	Low risk of collision or displacement
	Sanderling (*Calidris alba*) [A144]	Yes	Low risk of collision or displacement

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Greenland white-fronted goose (*Anser albifrons flavirostris*) [A395]	Yes	Low risk of collision or displacement
	Wetland and waterbirds [A999]	Yes	Low risk of collision or displacement
Tramore Back Strand SPA	Light-bellied brent goose (*Branta bernicla hrota*) [A046]	Yes	Low risk of collision or displacement
	Golden plover (*Pluvialis apricaria*) [A140]	Yes	Low risk of collision or displacement
	Grey plover (*Pluvialis squatarola*) [A141]	Yes	Low risk of collision or displacement
	Lapwing (*Vanellus vanellus*) [A142]	Yes	Low risk of collision or displacement
	Dunlin (*Calidris alpina*) [A149]	Yes	Low risk of collision or displacement
	Black-tailed godwit (*Limosa limosa*) [A156]	Yes	Low risk of collision or displacement
	Bar-tailed godwit (*Limosa lapponica*) [A157]	Yes	Low risk of collision or displacement
	Curlew (*Numenius arquata*) [A160]	Yes	Low risk of collision or displacement
	Wetland and Waterbirds [A999]	Yes	Low risk of collision or displacement

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
Wexford Harbour and Slobs SPA	Black-headed gull (*Chroicocephalus ridibundus*) [A156]	Yes	Low risk of collision. No risk of displacement
	Cormorant (*Phalacrocorax carbo*) [A017]	Yes	No risk of collision or displacement
	Lesser black-backed gull (*Larus fuscus*) [A183]	Yes	No risk of collision or displacement
	Little tern (*Sterna albifrons*) [A195]	Yes	Low risk of collision or displacement
	Little grebe (*Tachybaptus ruficollis*) [A004]	Yes	Low risk of collision or displacement
	Great crested grebe (*Podiceps cristatus*) [A005]	Yes	Low risk of collision or displacement
	Grey heron (*Ardea cinerea*) [A028]	Yes	Low risk of collision or displacement
	Bewick's swan (*Cygnus columbianus bewickii*) [A037]	Yes	Low risk of collision or displacement
	Whooper swan (*Cygnus cygnus*) [A038]	Yes	Low risk of collision or displacement
	Light-bellied brent goose (*Branta bernicla hrota*) [A046]	Yes	Low risk of collision or displacement
	Shelduck (*Tadorna tadorna*) [A048]	Yes	Low risk of collision or displacement

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Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Wigeon (*Anas penelope*) [A050]	Yes	Low risk of collision or displacement
	Teal (*Anas crecca*) [A052]	Yes	Low risk of collision or displacement
	Mallard (*Anas platyrhynchos*) [A053]	Yes	Low risk of collision or displacement
	Pintail (*Anas acuta*) [A054]	Yes	Low risk of collision or displacement
	Scaup (*Aythya marila*) [A062]	Yes	Low risk of collision or displacement
	Goldeneye (*Bucephala clangula*) [A067]	Yes	Low risk of collision or displacement
	Red-breasted merganser (*Mergus serrator*) [A069]	Yes	Low risk of collision or displacement
	Hen harrier (*Circus cyaneus*) [A082]	Yes	Low risk of collision or displacement
	Coot (*Fulica atra*) [A125]	Yes	Low risk of collision or displacement
	Oystercatcher (*Haematopus ostralegus*) [A130]	Yes	Low risk of collision or displacement
	Golden plover (*Pluvialis apricaria*) [A140]	Yes	Low risk of collision or displacement

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
	Grey plover (*Pluvialis squatarola*) [A141]	Yes	Low risk of collision or displacement
	Lapwing (*Vanellus vanellus*) [A142]	Yes	Low risk of collision or displacement
	Knot (*Calidris canutus*) [A143]	Yes	Low risk of collision or displacement
	Sanderling (*Calidris alba)* [A144]	Yes	Low risk of collision or displacement
	Dunlin (*Calidris alpina*) [A149]	Yes	Low risk of collision or displacement
	Black-tailed godwit (*Limosa limosa*) [A156]	Yes	Low risk of collision or displacement
	Bar-tailed godwit (*Limosa lapponica*) [A157]	Yes	Low risk of collision or displacement
	Curlew (*Numenius arquata*) [A160]	Yes	Low risk of collision or displacement
	Redshank (*Tringa totanus*) [A162]	Yes	Low risk of collision or displacement
	Greenland white-fronted goose (*Anser albifrons flavirostris*) [A395]	Yes	Low risk of collision or displacement
	Wetland and waterbirds [A999]	Yes	Low risk of collision or displacement

Searchable

Site Name	Qualifying Interest (QI)	Can LSE be excluded at the screening stage?	Why?
Wicklow Head SPA	Kittiwake (*Rissa tridactyla*) [A188]	No	Risk of collision. No risk of displacement

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9 Next steps

9.1.1.1 Having regard to the methodology employed and the findings of the Stage 1 screening appraisal, it is concluded that a Stage 2 AA of the implications of the Proposed Development, both alone and in-combination with other plans and projects, is required.

9.1.1.2 An NIS has been prepared in accordance with relevant guidance and focuses on the potential LSEs identified, for SACs listed in section 6.3.2 and 6.3.3 and SPAs listed in section 5, as a result of the Proposed Development alone, or in-combination with other elements of the Proposed Development or other relevant plans or projects. It is worth noting that while this document does not present a full in-combination assessment, the NIS assesses the sites identified within this screening exercise that have a potential pathway for effect in-combination.

Searchable

10 References

Aquafact International Services Ltd (2008) Proposed Dredge Disposal Sites for Arklow Harbour Commissioner. Available online: http://www.epa.ie/licences/lic_eDMS/090151b28037c91c.pdf [Accessed on 27/11/2018].

Aquatic Services Unit (2010). 'Arklow Bank Offshore Windfarm Environmental monitoring benthic ecology survey'. June 2009. University College Cork.

Atalah, J., Fitch, J., Coughlan, J., Chopelet, J., Coscia, I. and Farrell, E. (2013) Diversity of demersal and megafaunal assemblages inhabiting sandbanks of the Irish Sea. Marine Biodiversity, 43(2), pp.121-132.

Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. and Fuller, R.J., (2013). Bird Atlas 2007-11: the breeding and wintering birds of Britain and Ireland. Thetford: BTO.

Berrow,S., O'Brien, J., Ryan, C., McKeogh, E and Ian O'Connor, I (2011) Inshore Boat-based Surveys for Cetaceans – Irish Sea. Report to the National Parks and Wildlife Service. Irish Whale and Dolphin Group. pp.24.

BirdLife International (2004) State of the world's birds 2004: indicators for our changing world. Cambridge, UK: BirdLife International.

Bradbury G, Trinder M, Furness B, Banks AN, Caldow RWG, *et al.,* (2017) Correction: Mapping Seabird Sensitivity to Offshore Windfarms. PLOS ONE 12(1): e0170863. https://doi.org/10.1371/journal.pone.0170863

Carter, M. I., Boehme, L., Cronin, M. A., Duck, C. D., Grecian, W. J., Hastie, G. D., Jessopp, M., Matthiopoulos, J., McConnell, B. J., Miller, D. L. and Morris, C. D. (2022), 'Sympatric seals, satellite tracking and protected areas: habitat-based distribution estimates for conservation and management', Frontiers in Marine Science.

Carter. M., L. Boehme, C. Duck, W. Grecian, G. Hastie, B. McConnell, D. Miller, C. Morris, S. Moss, D. Thompson, P. Thompson, and D. Russell. 2020. Habitat-based predictions of at-sea distribution for grey and harbour seals in the British Isles. Sea Mammal Research Unit (SMRU), University of St Andrews, Report to BEIS, OESEA-16-76/OESEA-17-78

Celtic Sea Trout Project (2016) Milner, N., McGinnity, P. and Roche, W. Eds. Celtic Sea Trout Project – Technical Report to Ireland Wales Territorial Co-operation Programme 2007-2013 (INTERREG 4A). Dublin, Inland Fisheries Ireland. [Online] [Accessed 12 August 2020]. Available from http://celticseatrout.com/

Clarke, M., Farrell, E.D., Roche, W., Murray, T.E., Foster, S. and Marnell, F. (2016) Ireland Red List No. 11: Cartilaginous fish [sharks, skates, rays and chimaeras]. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs. Dublin, Ireland.

Codling Wind Park (2002) Offshore Windfarm at Codling Bank, Non-Technical Summary, Volume 2 of 3. Produced by Natural Power for Codling Wind Park. Page 25. Available at: http://codlingwindpark.ie/wp-content/uploads/2013/01/Codling-Non-Technical-Summary1.pdf.

Connor, D.W., Allen, J.H., Golding, N., Howell, K.L., Lieberknecht, L.M., Northen, K.O., & Reker, J.B. 2004. The Marine Habitat Classification for Britain and Ireland. Version 04.05. JNCC, Peterborough, ISBN 1 861 07561 8. Available at: https://hub.jncc.gov.uk/assets/d216bdbd-503b-4fc4-a9d8-69ea8266e03d

Coull, K.A., Johnstone, R, and Rogers, S.I. (1998) Fisheries Sensitivity Maps in British Waters. UKOOA Ltd: Aberdeen.

Searchable

Cramp, S. and Simmons, K.E.L. (1993). *Handbook of the Birds of Europe, the Middle East and North Africa: The Birds of the Western Palearctic*. Oxford University Press, USA.

Cramp S. and Simmons K.E.L. (Eds.) (1977 - 1994). The Birds of the Western Palearctic. Oxford University Press, Oxford.

Creane, S., O'Shea, M., Coughlan, M. and Murphy, J. (2023). Hydrodynamic Processes Controlling Sand Bank Mobility and Long-Term Base Stability: A Case Study of Arklow Bank. *Geosciences*, 13(2), pp.60–60. doi:https://doi.org/10.3390/geosciences13020060.

Cronin, M., Duck, C., Ó Cadhla, O., Nairn, R., Strong, D. and O' Keeffe, C. (2004), 'Harbour seal population assessment in the Republic of Ireland: August 2003', Irish Wildlife Manuals, No. 11, National Parks and Wildlife Service (Dublin, Ireland: Department of Environment, Heritage and Local Government).

Davies, J., Baxter, J., Bradley, M., Conner, D., Khan, J., Murray, E., Sanderson, W., Turnbull, C. and Vincent, M. [eds]. (2001). Marine Monitoring Handbook. UK Marine SACs Project. ISBN 1861075243. Available online from https://hub.jncc.gov.uk/assets/ed51e7cc3ef2-4d4f-bd3c-3d82ba87ad95 . [Accessed 16 May 2024]

DCCAE (2017), 'Guidance on EIS and NIS Preparation for Offshore Renewable Energy Projects'. Department of Communications, Climate Action and Environment, Dublin.

DEHLG (2010a), 'Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities' Department of the Environment, Heritage and Local Government, Dublin.

DEHLG (2010b), 'Department of Environment Heritage and Local Government Circular NPW 1/10 and PSSP 2/10 on Appropriate Assessment under Article 6 of the Habitats Directive – Guidance for Planning Authorities', Department of Environment Heritage and Local Government, Dublin.

Del Hoyo, J., Elliott, A and Sargatal, J (1996). *Handbook of the birds of the world.* Barcelona: Lynx Editions.

Del Hoyo, J., Elliott, A. and Sargatal, J. (Eds.) (1992 – 2011). Handbook of the Birds of the World. Lynx Editions, Madrid.

Department of Arts, Heritage and the Gaeltacht (DAHG), (2015), Slaney River Valley SAC, Site Synopsis, Site Code: 000781.

Dierschke, V, Furness, R.W and Garthe, S, (2016), 'Seabirds and offshore windfarms in European waters: Avoidance and attraction', Biological Conservation, 202, 59-68.

Doherty, P.D., Baxter, J.M., Gell, F.R., Godley, B.J., Graham, R.T., Hall, G., Hall, J., Hawkes, L.A., Henderson, S.M., Johnson, L. and Speedie, C. (2017) Long-term satellite tracking reveals variable seasonal migration strategies of basking sharks in the north-east Atlantic. Scientific reports, 7, p.42837.

Drewitt, A.L. and Langston, R.H.W. (2006). Assessing the impacts of windfarms on birds. *Ibis*, 148(s1), pp.29–42. doi:https://doi.org/10.1111/j.1474-919x.2006.00516.x.

Dublin Array Offshore Windfarm Limited (DAOWFL) (2012) An Offshore Windfarm on the Kish and Bray Banks, Environmental Impact Statement, January 2012 – Revision 1. Section 8: Marine Ecology. Dublin Array Offshore Windfarm Ltd. Available at: https://www.housing.gov.ie/sites/default/files/migrated-files/en/Foreshore/ApplicationsSubjecttoEIA/BrayOffshoreWindLtd/SupportingDocumentation/FileDownLoad%2C35120%2Cen.pdf.

Duck, C. and Morris, C. (2013), 'An aerial survey of harbour seals in Ireland: Part 2: Galway Bay to Carlingford Lough. August-September 2012', Unpublished report to the National Parks and Wildlife Service (Dublin: Department of Arts, Heritage and the Gaeltacht).

Searchable

Ellis, J.R., Cruz-Martinez, A., Rackham, B.D. and Rogers, S.I. (2005). The distribution of chondrichthyan fishes around the British Isles and implications for conservation. Journal of Northwest Atlantic fishery science, 35(195-213), p.113.

Ellis, J.R., Rogers, S.I. and Freeman, S.M. (2000) Demersal assemblages in the Irish Sea, St George's channel and Bristol channel. Estuarine, Coastal and Shelf Science, 51(3), pp.299-315.

Ellis, J.R., Milligan, S.P., Readdy, L., Taylor, N. and Brown, M.J. (2012). Spawning and nursery grounds of selected fish species in UK waters. Sci. Ser. Tech. Rep., Cefas Lowestoft, 147: 56 pp.

European Commission (2000), 'Communication from the Commission on the Precautionary Principle'. Office for Official Publications of the European Communities, Luxembourg.

European Commission (2001), 'Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC'. Office for Official Publications of the European Communities, Luxembourg.

European Commission (2009), 'Estuaries and Coastal Zones within the Context of the Birds and Habitats Directives - Technical Supporting Document on their Dual Roles as Natura 2000 Sites and as Waterways and Locations for Ports', Office for Official Publications of the European Communities, Luxembourg.

European Commission (2011a), 'Guidance document on the implementation of the birds and habitats directive in estuaries and coastal zones with particular attention to port development and dredging'. Office for Official Publications of the European Communities, Luxembourg.

European Commission (2013a), 'Interpretation Manual of European Union Habitats'. Version EUR 28. Office for Official Publications of the European Communities, Luxembourg.

European Commission, Directorate-General for Environment (2013b) Guidelines on climate change and Natura 2000 – Dealing with the impact of climate change, on the management of the Natura 2000 network of areas of high biodiversity value, Publications Office. https://data.europa.eu/doi/10.2779/29715

European Commission (2019) Notice C (2018) 7621, 'Managing Natura 2000 Sites: the provisions of Article 6 of the Habitats Directive 92/43/EEC'.Office for Official Publications of the European Communities, Luxembourg.

European Commission (2020) Notice C (2020) 7730 'Guidance document on wind energy developments and EU nature legislation', Office for Official Publications of the European Communities, Luxembourg.

European Commission (European Commission, 2011c), 'Guidance document: Wind Energy Developments and Natura 2000'.

European Commission (2021). Commission Notice – Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC. Official Journal of the European Union, 2021/C 437/01.

European Marine Observation and Data Network (EMODnet) (2019). Broad-scale seabed habitat map for Europe. Available at: EMODnet Map Viewer (europa.eu).

Fehily & Timoney & Co. (2001) Environmental Impact Statement: Arklow Bank Wind Park (Final Report). A report prepared for Sure Partners Ltd., 29 Lower Leeson St., Dublin 2.

FishBase (2023a) Biology of Pleuronectes platessa (Linnaeus, 1758). [Online]. [Accessed 15 May 2023]. Available from https://www.fishbase.se/summary/pleuronectes-platessa.html.

FishBase (2023b) Biology of Limanda limanda (Linnaeus, 1758). [Online]. [Accessed 15 May 2023]. Available from https://www.fishbase.se/summary/Limanda-limanda.html.

FishBase (2023c) Biology of Solea solea (Linnaeus, 1758). [Online]. [Accessed 15 May 2023]. Available from https://www.fishbase.se/summary/Limanda-limanda.html.

Searchable

FishBase (2023d) Biology of Clupea harengus (Linnaeus, 1758). [Online]. [Accessed 22 May 2023]. Available from https://fishbase.mnhn.fr/summary/24

FishBase (2023e) Biology of Merluccius merluccius (Linnaeus, 1758). [Online]. [Accessed 22 May 2023]. Available from https://fishbase.mnhn.fr/summary/SpeciesSummary.php?ID=30&AT=hake

FishBase (2023f) Biology of Merlangius merlangus (Linnaeus, 1758). [Online]. [Accessed 22 May 2023]. Available from https://fishbase.mnhn.fr/summary/SpeciesSummary.php?ID=29&AT=whiting

FishBase (2023g) Biology of Micromesistius poutassou (Risso, 1827). [Online]. [Accessed 22 May 2023]. Available from https://fishbase.mnhn.fr/summary/SpeciesSummary.php?ID=31&AT=blue+whiting

FishBase (2023h) Biology of Scomber scombrus (Linnaeus, 1758). [Online]. [Accessed 22 May 2023]. Available from https://fishbase.mnhn.fr/summary/SpeciesSummary.php?ID=118&AT=mackerel

FishBase (2023i) Biology of Gadus morhua (Linnaeus, 1758). [Online]. [Accessed 22 May 2023]. Available from https://fishbase.mnhn.fr/summary/SpeciesSummary.php?ID=69&AT=cod

FishBase (2023j) Biology of Squalus acanthias (Linnaeus, 1758). [Online]. [Accessed 5 June 2023]. Available from https://www.fishbase.se/summary/Squalus-acanthias.htmlFrost, T.M., Calbrade, N.A., Birtles, G.A., Hall, C., Robinson, A.E., Wotton, S.R., Balmer, D.E. and Austin, G.E., (2021). Waterbirds in the UK 2019/20: The wetland bird survey. *Thetford: BTO, RSPB and JNCC, in association with WWT*.

Fitzgerald, N., Burke, B. & Lewis, L.J. (2021) Irish Wetland Bird Survey: Results of waterbird monitoring in Ireland in 2016/17 and 2017/18. BirdWatch Ireland, Wicklow

Frost, T., Birtles, G., Calbrade, N., Austin, G., Baxter, M., Hammond, M. and Balmer, D. (2020). *The annual report of the Wetland Bird Survey*. [online] Available at: https://www.bto.org/sites/default/files/wituk-2018-19-web.pdf [Accessed 17 May 2024].

Furness, R.W (2015), 'Non-breeding season populations of seabirds in UK waters', Population sizes for Biologically Defined Minimum Population Scales (BDMPS), Natural England Commissioned Report Number 164. 389 pp.

Furness, R.W and Wade, H.M (2012), 'Vulnerability of Scottish seabirds to offshore wind turbines', Report to Marine Scotland.

Furness, R.W, Wade, H.M. and Masden, E.A (2013), 'Assessing vulnerability of marine bird populations to offshore windfarms', Journal of Environmental Management, 119, 56-66.

Gallagher, T., O'Gorman, N., Rooney, S.M., Brett, A., and O'Leary, C. (2023) National Programme: Habitats Directive and Red Data Book Species Summary Report 2022. Inland Fisheries Ireland, 3044 Lake Drive, Citywest, Dublin 24, Ireland.

Gastauer, S., Fässler, S.M., O'Donnell, C., Høines, Å., Jakobsen, J.A., Krysov, A.I., Smith, L., Tangen, Ø., Anthonypillai, V., Mortensen, E. and Armstrong, E., (2016) The distribution of blue whiting west of the British Isles and Ireland. Fisheries research, 183, pp.32-43.

Gavin & Doherty Geosolutions Ltd (2020a), 'Arklow Bank Wind Park (ABWP) Phase 2 Repeat Multibeam Survey (July – August 2020) Marine Mammal Mitigation Report', Document reference: 18086-R-001-01.

Gavin & Doherty Geosolutions Ltd (2020b), 'Arklow Bank Wind Park - Geotechnical Survey MMO Daily Observation Log Compilation Geoquip Saentis Campaign 2020', unpublished.

GE Wind Energy (2011) Arklow offshore windfarm environmental monitoring benthic ecology survey report June 2010.

GE Wind Energy (2012) Arklow offshore windfarm environmental monitoring benthic ecology survey report June 2011.

Searchable

GE Wind Energy (2021) Arklow offshore windfarm environmental monitoring benthic ecology survey report September 2021.

Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Boerjesson, P., Herr, H., Macleod, K., Ridoux, V., Santos, M., Scheidat, M., Teilmann, J., Vingada, J. and Oeien, N. (2017). Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. [online] Available at: https://scans3.wp.st-andrews.ac.uk/files/2021/06/SCANS-III_design-based_estimates_final_report_revised_June_2021.pdf [Accessed 17 May 2024].

Heinänen, S. & Skov, H (2015) The identification of discrete and persistent areas of relatively high harbour porpoise density in the wider UK marine area, JNCC Report No. 544, JNCC, Peterborough, ISSN 0963-8091.

Helm, R. C., Costa, D. P., DeBruyn, T. D., O'Shea, T. J., Wellws, R. S. and Williams, T. M. (2015), 'Overview of Effects of Oil Spills on Marine Mammals', in M. Fingas (eds.), Handbook of Oil Spill Science and Technology, First Edition (John Wiley and Sons, Inc).

Holling, M. and Rare Breeding Birds Panel (2011). Rare breeding birds in the United Kingdom in 2009. © *British Birds*, [online] 106, pp.496–554. Available at: https://britishbirds.co.uk/sites/default/files/2011_V104_N09_476-537_RBB2009.pdf [Accessed 17 May 2024].

Hydroserv (2004) Arklow Bank Offshore Windfarm Environmental Monitoring Benthic Ecology Survey Report. Spring/Summer 2004. Report to Arklow Energy Ltd

Hydroserv (2005) Arklow Bank Offshore Windfarm Environmental Monitoring Benthic Ecology Survey Report. October 2004. Report to Arklow Energy Ltd. Hydroserv. 2006. Arklow Bank Offshore Windfarm Environmental Monitoring Benthic Ecology Survey Report. June 2005. Report to Arklow Energy Ltd.

Hydroserv, (2008). Arklow Bank Offshore Windfarm Environmental Monitoring Benthic Ecology Survey Report. May 2007. Report to Arklow Energy Ltd.

HydroServ Projects Ltd (2007a) Arklow Bank Offshore Windfarm Environmental Monitoring Benthic Ecology Survey Report. Survey June 2006. A Report to HydroServ Projects Ltd February 2007.

HydroServ Projects Ltd (2007b) Arklow Bank Offshore Windfarm Environmental Monitoring Benthic Ecology Survey Report Survey May 2007. A Report to HydroServ December 2007.

Hydroserv (2009) Arklow Bank Offshore Windfarm Environmental Monitoring Benthic Ecology Survey Report. June 2008. Report to Arklow Energy Ltd.

IAMMWG (2022) Updated abundance estimates for cetacean Management Units in UK waters. JNCC Report No. 680 (Revised March 2022), JNCC Peterborough, ISSN 0963- 8091.

Inter-Agency Marine Mammal Working Group (2023), 'Review of Management Unit boundaries for cetaceans in UK waters.' JNCC Report 734 (Peterborough: Joint Nature Conservation Committee).

IAQM (2020), 'A guide to the assessment of air quality impacts on designated nature conservation sites (Version 1.1)', Institute of Air Quality Management, London.

Irish Whale and Dolphin Group (IWDG) (2019) http://www.iwdg.ie/

Inland Fisheries Ireland (IFI) (2015). Eel Monitoring Report 2012-2014. [Online]. [accessed 10 August 2023]. Available from: Eel Monitoring Programme 2012 - 2014.pdf (fisheriesireland.ie)

Inland Fisheries Ireland (IFI) (2018a) Consolidated Fish Counter Summary Report 2017. [Online]. [Accessed 10 August 2023]. Available from https://www.fisheriesireland.ie/extranet/fisheries-management-1/salmon/1493-ifi-consolidated-fish-counter-summary-report-2017.html.

Searchable

Inland Fisheries Ireland (IFI) (2018b) Report of the Technical Expert Group on Salmon: The status of Irish salmon stock in 2017 with catch advice for 2018. January 2018.

Inland Fisheries Ireland (IFI) (2022a). Wild Salmon and Sea Trout Statistics Report [Online]. [accessed 10 August 2023]. Available from: wild-salmon-and-sea-trout-statistics-report-2022.pdf (fisheriesireland.ie)

Inland Fisheries Ireland (IFI) (2022b). Consolidated Fish Counter Summary Report [Online]. [accessed 10 August 2023]. Available from: annual-fish-counter-summary-report-2022-final.pdf (fisheriesireland.ie)

International Council for the Exploration of the Sea (ICES) (2018) ICES Ecosystem Overviews – Celtic Seas Ecoregion. Available at: https://ices-library.figshare.com/articles/report/Celtic_Seas_Ecoregion_Ecosystem_overview/18633740

IWDG Consulting (2019), 'Arklow Wind Park Survey Marine Mammal Mitigation Report', 12pp.

Johnston, A., Cook, A.S.C.P., Wright, L.J., Humphreys, E.M. and Burton, E.H.K. (2014) Modelling flight heights of marine birds to more accurately assess collision risk with offshore wind turbines. Journal of Applied Ecology, 51: 31-41.

Leopold, M. F and Verdaat, H. J (2018), 'Pilot field study: Observations from a fixed platform on occurrence and behaviour of common guillemots and other seabirds in offshore windfarm', Wageningen Marine Research report C068/18. 27 pp.

JNCC (2023) Irish Sea Front Special Protection Area UK site: UK9020328 Conservation Objectives and Advice on Operations. Available online: https://data.jncc.gov.uk/data/f2ec1548-97a0-417c-8c73-2563514416b0/irish-sea-front-conservation-objectives-v-1-0.pdf (Accessed 11/10/2023)

Keegan, B., O'Connor, B., McGrath, D., Konnecker, G. and O'Foighill, D. (1987) Littoral and Benthic Investigations on the South Cats of Ireland: II. The Macrobenthic Fauna of Carnsore Point, Proceedings of the Royal Irish Academy. Section B: Biological, Geological, and Chemical Science, Vol 87B, pp1-14.

King, G.L. and Berrow, S. (2009) Marine turtles in Irish waters Special Supplement 2009 Irish Naturalists' Journal. January 2009.

King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. (2011) Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Kober, K., Webb, A., Win, I., Lewis, M., O'Brien, S., Wilson, L.J. and Reid, J.B. (2010). An analysis of the numbers and distribution of seabirds within the British Fishery Limit aimed at identifying Area that qualify as possible marine SPAs. JNCC Report, No. 431. JNCC, Peterborough.

Lacey, C., Gilles, A., Börjesson, P., Herr, H., Macleod, K., Ridoux, V., Santos, M., Scheidat, M., Teilmann, J., Sveegaard, S., Vingada, J., Viquerat, S., Øien, N. & Hammond, P. (2022) Modelled density surfaces of cetaceans in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys. [online] Available at: https://scans3.wp.st-andrews.ac.uk/files/2022/08/SCANSIII_density_surface_modelling_report_final_20220815.pdf [Accessed: 17 May 2024].

Lynam, C.P. & Ribeiro, J. (2022). A data product derived from Northeast Atlantic groundfish data from scientific trawl surveys 1983-2020. Cefas, UK. V1. doi: https://doi.org/10.14466/CefasDataHub.126

Marine Institute and Bord Iascaigh Mhara (2022) Shellfish Stocks and Fisheries Review 2022. [Online]. King selected stocks (marine.ie).

Masden E.A., Reeve, R., Desholm, M., Fox, A.D., Furness, R.W. and Haydon, D.T (2012), 'Assessing the impact of marine windfarms on birds through movement modelling', Journal of the Royal Society Interface, 9, 2120-2130.

Searchable

Masden, E.A., Haydon, D.T., Fox, A.D and Furness, R.W (2010), 'Barriers to movement: Modelling energetic costs of avoiding marine windfarms amongst breeding seabirds', Marine Pollution Bulletin, 60, 1085-1091.

McBreen, F., Wilson, J., Mackie, A. and Aonghusa, C. (2008) Seabed mapping in the southern Irish Sea: predicting benthic biological communities based on sediment characteristics, Hydrobiologica, 606:93-103.

Mellet, C., Lond, D. and Carter, G. (2015) Geology of the seabed and shallow subsurface: The Irish Sea. British Geological Survey Commissioned Report, CR/15/057, British Geological Survey (BGS) 52.

P. Ian Mitchell, Stephen F. Newton, Norman Ratcliffe and Timothy E. Dunn (Eds.) (2004)

Seabird Populations of Britain and Ireland: results of the Seabird 2000 census (1998-2002).

Published by T and A.D. Poyser, London.

MMO (2021). UK sea fisheries annual statistics report 2021. Available at: https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2021

Morris, C. D. and Duck, C. D. (2019), 'Aerial thermal-imaging survey of seals in Ireland, 2017 to 2018', Irish Wildlife Manuals, No. 111 National Parks and Wildlife Service (Ireland: Department of Culture, Heritage and the Gaeltacht).

Musgrove, A., Aebischer, N., Eaton, M., Hearn, R., Newson, S., Noble, D., Parsons, M., Risely, K., Stroud, D. and Powell, R. (2013). Population estimates of birds in Great Britain and the United Kingdom. © *British Birds*, [online] 106, pp.64–100. Available at: https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=8bd6670c789058502c7ec23d97d5f2ad66a5d47f [Accessed 14 Feb. 2024].

National Parks and Wildlife Service (NPWS) (2012a), 'Marine Natura Impact Statements in Irish Special Areas of Conservation: A working document', National Parks and Wildlife Service, Dublin.

National Parks and Wildlife Service (NPWS) (2013a) 'Conservation Objectives Series, Rockabill to Dalkey Island SAC', 003000, Version 1, ISSN 2009-4086.

National Parks and Wildlife Service (NPWS) (2013b) 'Wicklow Reef SAC (site code 2274) Conservation objectives supporting document – marine habitat V1', Castlemaine Biological Community Groups (npws.ie) [Accessed: Feb 2023].

National Parks and Wildlife Service (NPWS) (2013c), 'Blackwater Bank SAC (site code 2953) Conservation objectives supporting document – marine habitat V1', Castlemaine Biological Community Groups (npws.ie) [Accessed: Feb 2023].

National Parks and Wildlife Service (NPWS) (2014a), 'Irish guidance on assessment of underwater noise'.

National Parks and Wildlife Service (NPWS) 2011a Raven Point Nature Reserve SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000710.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2011b River Barrow and River Nore SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002162.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2011c Roaringwater Bay and Islands SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000101.pdf (Accessed 11/10/2023)

Searchable

National Parks and Wildlife Service (NPWS) 2011d Saltee Islands SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000707.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2011e Saltee Islands SPA Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004002.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2011f Slaney River Valley SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000781.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2012b Bannow Bay SPA Conservation Objectives Series Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004033.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2012c River Nanny Estuary and Shore SPA Conservation Objectives. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004158.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2012d The Raven SPA Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004019.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2012e Wexford Harbour and Slobs SPA Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004076.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2013d Baldoyle Bay SPA Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004016.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2013e Boyne Estuary SPA Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004080.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2013f Lambay Island SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000204.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2013g Long Bank SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002161.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2013h Malahide Estuary SPA Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004025.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2013i North Dublin Bay SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000206.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2013j Rockabill SPA Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004014.pdf (Accessed 11/10/2023)

Searchable

National Parks and Wildlife Service (NPWS) 2013k Rockabill to Dalkey Island SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO003000.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2013l Rogerstown Estuary SPA Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004015.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2013m South Dublin Bay SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000210.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2013n The Status of Protected EU Habitats and Species in Ireland. Overview Volume 1. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Editor: Deirdre Lynn. Accessed online 19/04/2024. Available from: https://www.npws.ie/sites/default/files/publications/pdf/Art17-Vol1-web.pdf

National Parks and Wildlife Service (NPWS) 2013o Tramore Back Strand SPA Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004027.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2013p Wicklow Reef SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002274.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2014b Ballyteige Burrow SPA Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004020.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2014c Horn Head and Rinclevan SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000147.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2014d Kilmuckridge-Tinnaberna Sandhills SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001741.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2015a North Bull Island SPA Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004006.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2015b South Dublin Bay SPA (also Sandymount Strand/Tolka Estuary Ramsar site) Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004024.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2016a Cahore Polders and Dunes SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000700.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2016b Howth Head SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000202.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2017a Bray Head SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000714.pdf (Accessed 11/10/2023)

Searchable

National Parks and Wildlife Service (NPWS) 2017b Buckroney-Brittas Dunes and Fen SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000729.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2017c Kilpatrick Sandhills SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001742.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2017d Lower River Suir SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002137.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2017e Magherabeg Dunes SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001766.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2021a Deputy's Pass Nature Reserve SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000717.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2021b River Boyne and River Blackwater SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002299.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2021c The Murrough Wetlands SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002249.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2022a Cahore Marshes SPA Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004143.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2022b Dalkey Islands SPA Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004172.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2022c Howth Head Coast SPA Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004113.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2022d Ireland's Eye SPA Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004117.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2022e Keeragh Islands SPA Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004118.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2022f Lady's Island Lake SPA Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004009.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2022g Lambay Island SPA Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004069.pdf (Accessed 11/10/2023)

Searchable

National Parks and Wildlife Service (NPWS) 2022h Skerries Island SPA Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004122.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2022i Tacumshin Lake SPA Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004092.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2022j The Murrough SPA Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004186.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2022k Wicklow Head SPA Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004127.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2023a Blackwater Bank SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002953.pdf (Accessed 11/10/2023)

National Parks and Wildlife Service (NPWS) 2023b Codling Fault Zone SAC Conservation Objectives Series. Available online: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO003015.pdf (Accessed 11/10/2023)

Natural England, JNCC and NRW (2016) Bristol Channel Approaches / Dynesfeydd Môr Hafren Draft Conservation Objectives and Advice on Activities. Available online: https://cdn.cyfoethnaturiol.cymru/media/679449/bristolchannelapproachesconservationobjectivesandadviceonactivities.pdf?mode=pad&rnd=131625760749900000 (Accessed 11/10/2023)

Natural Resources Wales (2015c) Anglesey Terns / Morwenoliaid Ynys Môn possible Special Protection Area: Draft conservation objectives. pp. 3. Available online: https:// naturalresources.wales/media/675726/anglesey-terns-pspa-draft-conservation-objectives-final.pdf (Accessed 12/10/2023)

Natural Resources Wales (2015d) Northern Cardigan Bay / Gogledd Bae Ceredigion Proposed SPA Draft Conservation Objectives. Available online: https://cdn.cyfoethnaturiol.cymru/media/675730/northern-cardigan-bay-pspa-draft-conservation-objectives-final.pdf?mode=pad&rnd=131625760747700000 (Accessed 11/10/2023)

Natural Resources Wales (2018a) Cardigan Bay/ Bae Ceredigion Special Area of Conservation. pp 41-44. Available online: https:// cdn.naturalresources.wales/media/687994/cym-cardigan-bay-reg-37-report-2018.pdf (Accessed 12/10/2023)

Natural Resources Wales (2018b) Pembrokeshire Marine / Sir Benfro Forol Special Area of Conservation. pp 77-80. Available online: https:// cdn.cyfoethnaturiol.cymru/media/687999/eng-pembrokeshire-marine-reg-37-report-2018.pdf (Accessed 12/10/2023)

Natural Resources Wales (2018c) Pen Llŷn a'r Sarnau / Lleyn Peninsula and the Sarnau Special Area of Conservation. pp 81 - 84. Available online: https:// cdn.naturalresources.wales/media/688001/eng-pen-llyn-ar-sarnau-reg-37-report-2018.pdf (Accessed 12/10/2023)

NatureScot (2024 South-East Islay Skerries SAC Conservation Objectives. Available online: https://sitelink.nature.scot/site/8381 (Accessed 11/10/2023)

NatureScot (2024 Treshnish Isles SAC Conservation Objectives. Available online: https://sitelink.nature.scot/site/8398 (Accessed 11/10/2023)

Searchable

NRW and JNCC 2016 Special Area of Conservation: West Wales Marine / Gorllewin Cymru Forol Draft Conservation Objectives and Advice on Activities. Available online: https://cdn.cyfoethnaturiol.cymru/media/681439/w-wales-marine-objectives-advice.pdf?mode=pad&rnd=131625760752270000 (Accessed 11/10/2023)

Ó Cadhla, O., Strong, D., O'Keeffe, C., Coleman, M., Cronin, M., Duck, C., Murray, T., Dower, P., Nairn, R., Murphy, P., Smiddy, P., Saich, C., Lyons, D. and Hiby, A. R. (2007) 'An assessment of the breeding population of grey seals in the Republic of Ireland, 2005', Irish Wildlife Manuals No. 34. National Parks and Wildlife Service (Dublin, Ireland: Department of the Environment, Heritage and Local Government).

Ó Cadhla, O., Keena, T., Strong, D., Duck, C. and Hiby, L. (2013), 'Monitoring of the breeding population of grey seals in Ireland, 2009 – 2012', Irish Wildlife Manuals, No. 74. National Parks and Wildlife Service (Dublin, Ireland: Department of the Arts, Heritage and the Gaeltacht).

Ó Cadhla, O. and Strong, D. (2007), 'Grey seal moult population survey in the Republic of Ireland, 2007,' Unpublished report. https://www.npws.ie/sites/default/files/publications/pdf/OCadhla_&_Strong_2007_Grey_Seal_Moult_Survey.pdf [Accessed: August 2023].

OPR (2021) *Practice Note Appropriate Assessment Screening for Development Management*, *OPR*. Available at: https://www.opr.ie/wp-content/uploads/2021/03/9729-Office-of-the-Planning-Regulator-Appropriate-Assessment-Screening-booklet-15.pdf (Accessed: 16 May 2024).

O'Sullivan, D., O'Keefe, E., Berry, A., Tully, O., and Clarke, M. (2013). An Inventory of Irish Herring Spawning Grounds. Irish Fisheries Bulletin No. 42: Marine Institute

Panigrahi, J.K., Ananth, P.N. and Umesh, P.A. (2009). Coastal morphological modeling to assess the dynamics of Arklow Bank, Ireland. *International Journal of Sediment Research*, 24(3), pp.299–314. doi:https://doi.org/10.1016/s1001-6279(10)60005-4.

Parker-Humphreys, M. (2004) Distribution and relative abundance of demersal fishes from beam trawl surveys in the Irish Sea (ICES Division VIIa) 1993–2001. Science Series Technical Report, CEFAS, Lowestoft, 120, 68 pp.

Paxton, C.G.M., Scott-Hayward, L., Mackenzie, M., Rexstad, E. & Thomas, L. (2016) Revised Phase III Data Analysis of Joint Cetacean Protocol Data Resource, JNCC Report No. 517, JNCC, Peterborough, ISSN 0963-8091.

Percival, S. (2013), 'Thanet Offshore Windfarm. Ornithological Monitoring 2012-2013 Final Report', http://ecologyconsult.co.uk/index_htm_files/Ornithological%20monitoring%202012-13%20v3.pdf [Accessed Feb 2023].

Percival, S.M. (2014), 'Kentish Flats Offshore Windfarm: Diver Surveys 2011-12 and 2012-13', Ecology Consulting report, Durham.

Robinson, K.A., Mackie, A.S., Lindenbaum, C., Darbyshire, T., van Landeghem, K.J. and Sanderson, W.G. (2012) Seabed Habitats of the Southern Irish Sea. In Seafloor Geomorphology as Benthic Habitat (pp. 523-537).

Robinson, R.A., 2005. BirdFacts: profiles of birds occurring in Britain & Ireland. *BTO Research Report*, *407*, p.Thetford.

Roche, C., Lyons, D.O., Farinas Franco, J. and O'Connor, B. (2007) Benthic surveys of sandbanks in the Irish Sea. Irish Wildlife Manuals, No. 29. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

RPS (2019), Arklow Bank Wind Park, Phase 1 Intertidal Walkover Survey Report.

Searchable

Russell, D. J. F., Duck, C., Morris, C. and Thompson, D. (2016), 'Independent estimates of grey seal population size: 2008 and 2014', SCOS Briefing paper 16/3, Sea Mammal Research Unit, University of St Andrews.

SCOS (2021). *Scientific Advice on Matters Related to the Management of Seal Populations: 2021 Natural Environment Research Council Special Committee on Seals*. [online] Available at: https://www.smru.st-andrews.ac.uk/files/2022/08/SCOS-2021.pdf [Accessed 17 May 2024].

SCOS (2022). *Scientific Advice on Matters Related to the Management of Seal Populations: 2022 Natural Environment Research Council Special Committee on Seals*. [online] Available at: https://www.smru.st-andrews.ac.uk/files/2023/09/SCOS-2022.pdf. [Accessed 17 May 2024].

Stienen, E., Waeyenberge, V., Kuijken, E. and Seys, J. (2007). *The potential impact of offshore windfarms on seabirds*. [online] Available at: https://purews.inbo.be/ws/portalfiles/portal/18423683/129847.pdf [Accessed 17 May 2024].

Southall, E.J., Sims, D.W., Metcalfe, J.D., Doyle, J.I., Fanshawe, S., Lacey, C., Shrimpton, J., Solandt, J.L. and Speedie, C.D., (2005). Spatial distribution patterns of basking sharks on the European shelf: preliminary comparison of satellite-tag geolocation, survey and public sightings data. Marine Biological Association of the United Kingdom. Journal of the Marine Biological Association of the United Kingdom, 85(5), p.1083.

SMRU (2006). *Small Cetaceans in the European Atlantic and North Sea (SCANS-II)*. [online] Available at: https://www.ascobans.org/sites/default/files/document/AC15_21_SCANS%20II_FinalReport-Dec07_1.pdf [Accessed 17 May 2024].

SMRU (2015). *Small Cetaceans in European Atlantic waters and the North Sea (SCANS-III): Revised Proposal*. [online] Available at: https://www.ascobans.org/sites/default/files/document/AC20_4.1.a_SCANSIII.pdf [Accessed 17 May 2024].

Speakman, J, Gray, H and Furness, L (2009), 'University of Aberdeen report on effects of offshore windfarms on the energy demands of seabirds', Report to the Department of Energy and Climate Change.

Thaxter, C.B, Lascelles, B, Sugar, K, Cook, A.S, Roos, S, Bolton, M, Langston, R.H & Burton, N.H (2012), 'Seabird foraging ranges as a preliminary tool for identifying Marine Protected Areas', Biological Conservation, 156, 53-61.

Ultrabeam Ltd. (2019). 'Geophysical survey UHC19004, June – July 2019'.

Van de Kam, J, Ens, B, Piersma, T. and Zwarts, L. (2004), 'Shorebirds', An Illustrated Behavioural Ecology, KNNV, Netherlands, 368.

Wakefield *et al.,* (2013), 'Space Partitioning Without Territoriality in Gannets', Science, 341, 68-70.

Wernham, C.V, Toms, M.P, Marchant, J.H, Clark, J.A, Siriwardena, G.M & Baillie, S.R (2002), 'The Migration Atlas', Movements of the birds of Britain and Ireland, Poyser, London.

Whitehead, S, Johnstone, I, and Wilson, J, (2005), 'Choughs Pyrrhocorax pyrrhocorax breeding in Wales select foraging habitat at different spatial scales Bird Study', 52:2,193-203.

Woodward, I, Thaxter, C.B, Owen, E. and Cook, A.S (2019), 'Desk-based revision of seabird foraging ranges used for HRA screening', TO Report 724 for The Crown Estate.

Wright, L.J., Ross-Smith, V.H., Massimino, D., Dadam, D., Cook, A.S.C.P. and Burton, N.H.K. (2012). Assessing the risk of offshore windfarm development to migratory birds designated as features of UK Special Protection Area (and other Annex I species). Strategic Ornithological Support Services. Project SOSS-05. BTO Research Report No. 592.

Searchable

Wyn, G, Brazier, P, Birch, K, Bunker, A, Cooke, A, Jones, M, Lough, N, McMath, A & Roberts, S (2006), Handbook for Marine Intertidal Phase 1 Biotope Mapping Survey, Report from Countryside Council for Wales

Searchable

11 Appendix 1: Filtered Tables of European Sites

Table 11.1: SACs with terrestrial QIs for which there is no pathway of effect with the Proposed Development

Site Name	Qualifying Interest
Bray Head SAC	European dry heaths [4030]
Buckroney-Brittas Dunes and Fen SAC	Alkaline fens [7230]
Deputy's Pass Nature Reserve SAC	Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]
Howth Head SAC	European dry heaths [4030]
Lower River Suir SAC	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]
	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]
	Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]
	Taxus baccata woods of the British Isles [91J0]
Magherabeg Dunes SAC	Petrifying springs with tufa formation (*Cratoneurion*) [7220]
River Barrow and River Nore SAC	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]
	Vertigo moulinsiana (Desmoulin's Whorl Snail) [1016]
	Trichomanes speciosum (Killarney Fern) [1421]
	European dry heaths [4030]
	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]

Searchable

Site Name	Qualifying Interest
	Petrifying springs with tufa formation (*Cratoneurion*) [7220]
	Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]
River Boyne and River Blackwater SAC	Alluvial forests with Alnus *glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]
	Alkaline fens [7230]
Slaney River Valley SAC	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) [91E0]
	Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0]
The Murrough Wetlands SAC	Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210]
	Alkaline fens [7230]

Searchable

Table 11.2: SAC with freshwater QIs for which there is no pathway of effect with the Proposed Development

Site Name	Qualifying Interest
Lower River Suir SAC	*Austropotamobius pallipes* (White-clawed Crayfish) [1092]
	Lampetra planeri (Brook Lamprey) [1096]
	Lutra lutra (Otter) [1355]
	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]
Lleyn Peninsula and the Sarnau SAC	*Lutra lutra* (Otter) [1355]
Pembrokeshire Marine/Sir Benfro Forol SAC	*Lutra lutra* (Otter) [1355]
River Barrow and River Nore SAC	*Austropotamobius pallipes* (White-clawed Crayfish) [1092]
	Lampetra planeri (Brook Lamprey) [1096]
	Lutra lutra (Otter) [1355]
	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]
River Boyne and River Blackwater SAC	*Lutra lutra* (Otter) [1355]
Slaney River Valley SAC	*Lampetra planeri* (Brook Lamprey) [1096]
	Lutra lutra (Otter) [1355]
	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260]

Searchable

Table 11.3: Coastal SAC QIs for which there may be a pathway of effect with the Proposed Development

Site Name	Qualifying Interest
Bray Head SAC	Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]
Buckroney-Brittas Dunes and Fen SAC	Annual vegetation of drift lines [1210]
	Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) [2150]
	Dunes with Salix repens ssp. argentea (*Salicion arenariae*) [2170]
	Embryonic shifting dunes [2110]
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]
	Humid dune slacks [2190]
	Mediterranean salt meadows (*Juncetalia maritimi*) [1410]
	Perennial vegetation of stony banks [1220]
	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]
Cahore Polders and Dunes SAC	Annual vegetation of drift lines [1210]
	Embryonic shifting dunes [2110]
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]
	Humid dune slacks [2190]
	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]
Howth Head SAC	Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]
Kilmuckridge-Tinnaberna Sandhills SAC	Embryonic shifting dunes [2110]

Searchable

Site Name	Qualifying Interest
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]
	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]
Kilpatrick Sandhills SAC	Annual vegetation of drift lines [1210]
	Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) [2150
	Embryonic shifting dunes [2110]
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]
	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]
Lambay Island SAC	Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]
Lower River Suir SAC	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]
	Mediterranean salt meadows (*Juncetalia maritimi*) [1410]
Lleyn Peninsula and the Sarnau SAC	Salicornia and other annuals colonising mud and sand [1310]
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]
Magherabeg Dunes SAC	Annual vegetation of drift lines [1210]
	Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) [2150]
	Embryonic shifting dunes [2110]
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]
	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]

Searchable

Site Name	Qualifying Interest
Murlough SAC	Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) [2150]
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]
	Dunes with Salix repens ssp. argentea (*Salicion arenariae*) [2170]
	Embryonic shifting dunes [2110]
	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]
North Dublin Bay SAC	Annual vegetation of drift lines [1210]
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]
	Embryonic shifting dunes [2110]
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]
	Humid dune slacks [2190]
	Mediterranean salt meadows (*Juncetalia maritimi*) [1410]
	Petalophyllum ralfsii (Petalwort) [1395]
	Salicornia and other annuals colonising mud and sand [1310]
	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]
Pembrokeshire Marine/Sir Benfro Forol SAC	Shore dock (*Rumex rupestris*) [1441]
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]
Raven Point Nature Reserve SAC	Annual vegetation of drift lines [1210]

Searchable

Site Name	Qualifying Interest
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]
	Dunes with Salix repens ssp. argentea (*Salicion arenariae*) [2170]
	Embryonic shifting dunes [2110]
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]
	Humid dune slacks [2190]
	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]
River Barrow and River Nore SAC	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]
	Mediterranean salt meadows (*Juncetalia maritimi*) [1410]
	Salicornia and other annuals colonising mud and sand [1310]
Saltee Islands SAC	Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]
Slaney River Valley SAC	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]
	Mediterranean salt meadows (*Juncetalia maritimi*) [1410]
South Dublin Bay SAC	Annual vegetation of drift lines [1210]
	Embryonic shifting dunes [2110]
	Salicornia and other annuals colonizing mud and sand [1310]
The Murrough Wetlands SAC	Annual vegetation of drift lines [1210]
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]
	Mediterranean salt meadows (*Juncetalia maritimi*) [1410]

Searchable

Site Name	Qualifying Interest
	Perennial vegetation of stony banks [1220]

Searchable

Table 11.4: Marine SAC QIs for which there may be a pathway of effect with the Proposed Development

Site Name	Qualifying Interest
Wicklow Reef SAC	Reefs [1170]
Blackwater Bank SAC	Sandbanks which are slightly covered by sea water all the time [1110]
Slaney River Valley SAC	*Petromyzon marinus* (sea lamprey) [1095]
	Alosa fallax (twaite shad) [1103]
	Salmo salar (Atlantic salmon) [1106]
	Margaritifera margaritifera (Freshwater Pearl Mussel) [1029]
	Lampetra fluviatilis (river lamprey) [1099]
	Phoca vitulina (harbour seal) [1365]
	Estuaries [1130]
	Mudflats and sandflats not covered by seawater at low tide [1140]
Rockabill to Dalkey Island SAC	*Phocoena phocoena* (harbour porpoise) [1351]
	Reefs [1170]
Long Bank SAC	Sandbanks which are slightly covered by sea water all the time [1110]
Raven Point Nature Reserve SAC	Mudflats and sandflats not covered by seawater at low tide [1140]
South Dublin Bay SAC	Mudflats and sandflats not covered by seawater at low tide [1140]
Codling Fault Zone SAC	Submarine structures made by leaking gases [1180]
West Wales Marine / Gorllewin Cymru Forol SAC	*Phocoena phocoena* (harbour porpoise) [1351]

Searchable

Site Name	Qualifying Interest
North Dublin Bay SAC	Mudflats and sandflats not covered by seawater at low tide [1140]
River Barrow and River Nore SAC	*Lampetra fluviatilis* (river lamprey) [1099]
	Petromyzon marinus (sea lamprey) [1095]
	Alosa fallax (twaite shad) [1103]
	Salmo salar (Atlantic salmon) [1106]
	Margaritifera margaritifera (Freshwater Pearl Mussel) [1029]
	Margaritifera durrovensis (Nore Pearl Mussel) [1990]
	Estuaries [1130]
	Mudflats and sandflats not covered by seawater at low tide [1140]
	Reefs [1170]
North Anglesey Marine / Gogledd Môn Forol SAC	*Phocoena phocoena* (harbour porpoise) [1351]
Lambay Island SAC	Reefs [1170]
	Halichoerus grypus (grey seal) [1364]
	Phoca vitulina (harbour seal) [1365]
Saltee Islands SAC	Mudflats and sandflats not covered by seawater at low tide [1140]
	Large shallow inlets and bays [1160]
	Reefs [1170]

Searchable

Site Name	Qualifying Interest
	Halichoerus grypus (grey seal) [1364]
	Submerged or partially submerged sea caves [8330]
Pen Llyn a`r Sarnau/ Lleyn Peninsula and the Sarnau SAC	Sandbanks which are slightly covered by sea water all the time [1110]
	Estuaries [1130]
	Coastal lagoons [1150]
	Large shallow inlets and bays [1160]
	Reefs [1170]
	Mudflats and sandflats not covered by seawater at low tide [1140]
	Submerged or partially submerged sea caves [8330]
	Halichoerus grypus (grey seal) [1364]
	Tursiops truncatus (bottlenose dolphin) [1349]
Cardigan Bay/ Bae Ceredigion SAC	*Tursiops truncatus* (bottlenose dolphin) [1349]
	Halichoerus grypus (grey seal) [1364]
	Sandbanks which are slightly covered by sea water all the time [1110]
	Reefs [1170]
	Submerged or partially submerged sea caves [8330]
	Petromyzon marinus (sea lamprey) [1095]
	Lampetra fluviatilis (river lamprey) [1099]

Searchable

Site Name	Qualifying Interest
Lower River Suir SAC	*Lampetra fluviatilis* (river lamprey) [1099]
	Petromyzon marinus (sea lamprey) [1095]
	Alosa fallax (twaite shad) [1103]
	Salmo salar (Atlantic salmon) [1106]
	Margaritifera margaritifera (Freshwater Pearl Mussel) [1029]
Murlough SAC	*Phoca vitulina* (harbour seal) [1365]
	Mudflats and sandflats not covered by seawater at low tide [1140]
	Sandbanks which are slightly covered by sea water all the time [1110]
Pembrokeshire Marine/Sir Benfro Forol SAC	Estuaries [1130]
	Large shallow inlets and bays [1160]
	Reefs [1170]
	Halichoerus grypus (grey seal) [1364]
	Sandbanks which are slightly covered by sea water all the time [1110]
	Mudflats and sandflats not covered by seawater at low tide [1140]
	Coastal lagoons [1150]
	Submerged or partially submerged sea caves [8330]
	Petromyzon marinus (sea lamprey) [1095]
	Lampetra fluviatilis (river lamprey) [1099]

Searchable

Site Name	Qualifying Interest
	Allis shad *Alosa alosa* [1102]
	Alosa fallax (twaite shad) [1103]
Bristol Channel Approaches /Dynesfeydd Môr Hafren SAC	*Phocoena phocoena* (harbour porpoise) [1351]
North Channel SAC	*Phocoena phocoena* (harbour porpoise) [1351]
River Boyne and River Blackwater SAC	*Lampetra fluviatilis* (river lamprey) [1099]
	Salmo salar (Atlantic salmon) [1106]

Searchable

Table 11.5: SPAs designated for breeding seabird populations for which there may be a pathway of effect with the Proposed Development

Site Name	Special Conservation Interests (SPAs) or Qualifying Interests (SACs)
Wicklow Head SPA	Kittiwake (*Rissa tridactyla*) [A188]
The Murrough SPA	Black-headed gull (*Chroicocephalus ridibundus*) [A179]
	Herring gull (*Larus argentatus*) [A184]
	Little tern (*Sterna albifrons*) [A195]
	Red-throated diver (*Gavia stellata*) [A001]
The Raven SPA	Cormorant (*Phalacrocorax carbo*) [A017]
	Red-throated diver (*Gavia stellata*) [A001]
Dalkey Islands SPA	Arctic tern (*Sterna paradisaea*) [A194]
	Common tern (*Sterna hirundo*) [A193]
	Roseate tern (*Sterna dougallii*) [A192]
Wexford Harbour and Slobs SPA	Black-headed gull (*Chroicocephalus ridibundus*) [A179]
	Cormorant (*Phalacrocorax carbo*) [A017]
	Lesser black-backed gull (*Larus fuscus*) [A183]
	Little tern (*Sterna albifrons*) [A195]
South Dublin Bay and River Tolka Estuary SPA	Arctic tern (*Sterna paradisaea*) [A194]
	Black-headed gull (*Chroicocephalus ridibundus*) [A179]

Searchable

Site Name	Special Conservation Interests (SPAs) or Qualifying Interests (SACs)
	Common tern (*Sterna hirundo*) [A193]
	Roseate tern (*Sterna dougallii*) [A192]
Howth Head Coast SPA	Kittiwake (*Rissa tridactyla*) [A188]
North Bull Island SPA	Black-headed gull (*Chroicocephalus ridibundus*) [A179]
Ireland's Eye SPA	Cormorant (*Phalacrocorax carbo*) [A017]
	Guillemot (*Uria aalge*) [A199]
	Herring gull (*Larus argentatus*) [A184]
	Kittiwake (*Rissa tridactyla*) [A188]
	Razorbill (*Alca torda*) [A200]
Lady's Island Lake SPA	Arctic tern (*Sterna paradisaea*) [A194]
	Black-headed gull (*Chroicocephalus ridibundus*) [A179]
	Common tern (*Sterna hirundo*) [A193]
	Roseate tern (*Sterna dougallii*) [A192]
	Sandwich tern (*Sterna sandvicensis*) [A191]
Lambay Island SPA	Cormorant (*Phalacrocorax carbo*) [A017]
	Fulmar (*Fulmarus glacialis*) [A009]
	Guillemot (*Uria aalge*) [A199]

Searchable

Site Name	Special Conservation Interests (SPAs) or Qualifying Interests (SACs)
	Herring gull (*Larus argentatus*) [A184]
	Kittiwake (*Rissa tridactyla*) [A188]
	Lesser black-backed gull (*Larus fuscus*) [A183]
	Puffin (*Fratercula arctica*) [A204]
	Razorbill (*Alca torda*) [A200]
	Shag (*Phalacrocorax aristotelis*) [A018]
Aberdaron Coast and Bardsey Island / Glannau Aberdaron and Ynys Enlli SPA	Manx shearwater *Puffinus puffinus* [A013]
	Chough *Pyrrhocorax pyrrhocorax* [A346]
Saltee Islands SPA	Cormorant (*Phalacrocorax carbo*) [A017]
	Fulmar (*Fulmarus glacialis*) [A009]
	Gannet (*Morus bassanus*) [A016]
	Guillemot (*Uria aalge*) [A199]
	Herring gull (*Larus argentatus*) [A184]
	Kittiwake (*Rissa tridactyla*) [A188]
	Lesser black-backed gull (*Larus fuscus*) [A183]
	Puffin (*Fratercula arctica*) [A204]
	Razorbill (*Alca torda*) [A200]

Searchable

Site Name	Special Conservation Interests (SPAs) or Qualifying Interests (SACs)
	Shag (*Phalacrocorax aristotelis*) [A018]
Rockabill SPA	Arctic tern (*Sterna paradisaea*) [A194]
	Common tern (*Sterna hirundo*) [A193]
	Roseate tern (*Sterna dougallii*) [A192]
Keeragh Islands SPA	Cormorant (*Phalacrocorax carbo*) [A017]
Skerries Island SPA	Cormorant (*Phalacrocorax carbo*) [A017]
	Herring gull (*Larus argentatus*) [A184]
	Shag (*Phalacrocorax aristotelis*) [A018]
Anglesey Terns / Morwenoliaid Ynys Môn SPA	Arctic tern (*Sterna paradisaea* [A194]
	Common tern (*Sterna hirundo*) [A193]
	Roseate tern (*Sterna dougallii*) [A192]
	Sandwich tern (*Sterna sandvicensis*) [A191]
River Nanny Estuary and Shore SPA	Herring gull (*Larus argentatus*) [A184]
Boyne Estuary SPA	Little tern (*Sterna albifrons*) [A195]
Irish Sea Front SPA	Manx shearwater (*Puffinus puffinus*) [A013]
Northern Cardigan Bay / Gogledd Bae Ceredigion SPA	Red throated diver (*Gavia stellata*) [A001]
Grassholm SPA	Gannet (*Morus bassanus*) [A016]

Searchable