Natura Impact Statement (NIS)

Maritime Usage Licence Application MUL230034

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codling wind park

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ABBREVIATIONS

Abbreviation	Term
AA	Appropriate Assessment
ADCP	Acoustic Doppler Current Profiler
AIMU	Assessment of Impacts of the Maritime Usage Report
CA	Competent Authority
CEFAS	The Centre for Environment, Fisheries and Aquaculture Science
CIEEM	Chartered Institute of Ecology and Environmental Management
CO	Conservation Objective
COSHH	Control of Substances Hazardous to Health
CPT	Cone Penetration Test
cSAC	candidate Special Areas of Conservation
CWP	Codling Wind Park
CWPL	Codling Wind Park Limited
dB	decibel
DDV	Drop Down Video
DEHLG	Department of Environment, Heritage and Local Government
DHLGH	Department of Housing, Local Government and Heritage
ECC	Export Cable Corridor
EDF	Électricité de France
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPS	European Protected Species
ESAS	European Seabirds at Sea
EU	European Union
FIL	Foreshore Investigation Licence
FLiDAR	Floating Light Detecting and Ranging
FLO	Fisheries Liaison Officer
FLS	Floating LiDAR System

Abbreviation	Term
FWPM	Freshwater pearl mussel
ha	hectares
HDD	Horizontal Directional Drilling
HF	High frequency
hr	Hour
HSEQ	Health, Safety, Environment and Quality
Hz	Hertz
IAMMWG	Inter-Agency Marine Mammal Working Group
ICES	International Council for the Exploration of the Sea
IEMP	Integrated Ecological Management Plan
IMO	International Maritime Organisation
INFOMAR	Integrated Mapping for the Sustainable Development of Ireland's Marine Resource
IROPI	Imperative reasons of overriding public interest
IUCN	The International Union for Conservation of Nature
JNAPC	Joint Nautical Archaeology Policy Committee
JNCC	Joint Nature Conservation Committee
Kg	Kilogram
kHz	KiloHertz
km	Kilometres
LSE	Likely Significant Effects
m	metres
MARPOL	International Convention for the Prevention of Marine Pollution from Ships
MBES	Multibeam Echosounders
MCA	Maritime and Coastguard Agency (UK)
MGN	Marine Guidance Note
MHWS	Mean High-Water Spring
mm	millimetres
MMO	Marine Mammal Observer
MoD	Ministry of Defence (UK)

Abbreviation	Term
MPDM	Marine Planning and Development Management
MSL	Mean Sea Level
MU	Management Unit
MUL	Maritime Usage Licence
MULA	Maritime Usage Licence Application
MW	Megawatt
NGOs	Non-Governmental Organisations
NIS	Natura Impact Statement
NM	Nautical miles
NMPF	National Marine Planning Framework
NMS	National Monuments Services
NOAA	National Oceanic and Atmospheric Administration
NPWS	National Parks and Wildlife Services
ObSERVE	A major marine scientific programme established in October 2014, with the main aim to greatly improve the knowledge and understanding of protected offshore species and sensitive habitats through high quality, state-of-the-art data collection across Ireland's EEZ.
OMB	Operation and Maintenance Base
PCBs	Polychlorinated Biphenyls
PCW	Phocid carnivores in water
PSA	Particle Size Analysis
pSPA	proposed Special Protection Area
PTS	Permanent Threshold Shift
QIs	Qualifying Interests
RAMS	Risk Avoidance Method Statements
RMPs	Records of Monuments and Places
SAC	Special Area of Conservation
SBP	Sub-bottom Profiling
SCANS-III	Small Cetaceans in European Atlantic waters and the North Sea, conducted in 2016
SCANS-IV	Small Cetaceans in European Atlantic waters and the North Sea, conducted in 2022
SCIs	Special Conservation Interests

Abbreviation	Term
SEL	Sound Exposure Level
SFPA	Sea Fisheries Protection Authority
SISAA	Supporting Information: Screening for Appropriate Assessment
SNCB	Statutory nature conservation body
SPA	Special Protection Areas
SPL	Sound Pressure Level
SSC	Suspended Sediment Concentration
SSS	Sidescan Sonar
SSSI	Site of Special Scientific Interest
TBD	To be determined
TOC	Total Organic Carbon
TTS	Temporary Threshold Shift
UHRS	Ultra-High Resolution Seismic
USBL	Ultra-Short Baseline
VHF	Very high frequency
ZoI	Zone of Influence

DEFINITIONS

Term	Definition
Annex IV Risk Assessment	Information provided to the competent authority to inform a risk assessment for Annex IV species under Article 12 of the Habitats Directive (92.43/EEC)
Licence Application Area	The area subject to the Marine Usage Licence Application under the Maritime Area Planning Act 2021.
Array Area	The part of an Offshore Wind Farm which commonly includes wind turbines and their foundations, and internal electrical cabling and offshore substation. The current CWP array area is illustrated on Figure 3.1 in Appendix A.
Codling Wind Park (CWP)	Codling Wind Park is the name of the proposed Offshore Wind Farm being development by Codling Wind Park Limited. It encapsulates the area covered by the Foreshore Lease granted for the original Codling Wind Park in 2005, and the Foreshore Lease Application for Codling Wind Park Extension.
Department of Housing, Local Government and Heritage (DHLGH)	The Irish government department responsible for housing, planning and local government.
Environmental Impact Assessment (EIA)	A systematic means of assessing a development projects likely significant environmental effects undertaken in accordance with the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.
Foreshore Lease	Leases that were granted prior to the MAP Act 2021, under the Foreshore Act 1933 for the erection of long-term structures (e.g. piers, marinas, bridges, roads, car parks).
Foreshore Licence	Licences that were granted prior to the MAP Act 2021, under the Foreshore Act 1933 for other works (e.g. laying of submarine pipelines and cables) and purposes (e.g. aquaculture).
Maritime Area Regulatory Authority (MARA)	MARA is a body under the aegis of the Department of Housing, Local Government and Heritage, whose functions are set out in the Maritime Area Planning Act 2021. MARA are responsible for managing the existing foreshore consent portfolio, and processing Maritime Usage Licences (MUL) and Maritime Area Consents (MACs).
Mean High Water Springs (MHWS)	The highest-level which spring tides reach on average over a period of time above chart datum.
Maritime Usage Licence (MUL)	Licences granted under the MAP Act 2021 for a number of a number of marine based activities, including Marine Environmental surveys for the purposes of scientific discovery and site investigations.
National Parks and Wildlife Service	The National Parks and Wildlife Service manages the Irish State's nature conservation responsibilities. As well as managing the national parks, the activities of the NPWS include the designation and protection of Natural Heritage Areas, Special Areas of Conservation and Special Protection Areas.
Population viability analysis	Population viability analysis is a species-specific method of risk assessment frequently used in conservation biology. It is traditionally defined as the process that determines the probability that a population will go extinct within a given number of years.

Definition	Term
Proposed Activities	All of the site investigations and baseline surveys the subject of the Maritime Usage Licence Application.
Receptor	Environmental component that may be affected, adversely or beneficially, by an impact.
Remotely Operated Vehicle	A remotely operated underwater vehicle is a tethered underwater mobile device. ROVs are unoccupied, highly manoeuvrable, and operated by a crew either aboard a vessel/floating platform or on proximate land.
Special Area of Conservation (SAC)	Areas of protected habitats and species as defined in the Habitats Directive.
Special Protection Area (SPA)	Sites classified in accordance with Article 4 of the EC Birds Directive (79/409/EEC) which came into force in April 1979. They are classified for rare and vulnerable birds (as listed on Annex 1 of the Directive), and for regularly occurring migratory Species.
Species	A group of interbreeding organisms that seldom or never interbreed with individuals in other such groups, under natural conditions; most species are made up of subspecies or populations.
Staging site	Places where migrant birds stop to rest, drink, and eat during migration to their final wintering destination.
Zone of Influence (ZoI)	Spatial extent of potential impacts resulting from a project or activity.

1 EXECUTIVE SUMMARY

Codling Wind Park Limited, have applied for a Maritime Usage Licence from the Maritime Area Regulatory Authority under the Maritime Area Planning Act (2021), to undertake Site Investigation Activities to inform the detailed design stage of the proposed Codling Wind Park. The Proposed Activities to be carried out under the Maritime Usage Licence comprise of marine geophysical, hydrographic, geotechnical, benthic subtidal and intertidal ecological, environmental, metocean, and archaeological surveys.

The Stage One Supporting Information: Screening for Appropriate Assessment (SISAA) Report (document reference CWP-CWP-CON-02-01-09-ASM-0001) concludes, ratified by the screening decision carried out by Maritime Area Regulatory Authority (MARA), that Likely Significant Effects (LSEs) could not be excluded at screening stage for one hundred and five Natura 2000 sites, without further evaluation and analysis, or the application of measures intended to avoid or reduce the potential for harmful effects of the Proposed Activities on the sites concerned.

At Stage Two, the impact of a project or plan alone or in combination with other projects and/ or plans on the integrity of the Natura 2000 sites is considered with respect to the conservation objectives (COs) of the site, and to its structure and function. Stage Two Appropriate Assessment (AA) must include a Natura Impact Statement (NIS) which provides a determination as to whether the Proposed Activities are likely to have a significant effect on Natura 2000 sites, which comprise of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). This report presents a summary of Stage One, followed by the NIS which is the detailed Stage Two assessment.

At Stage One the possibility of LSEs on the following one hundred and nine Natura 2000 sites could not be excluded, this has since been reviewed and updated to thirty three Natura 2000 sites:

For Marine Ornithology

- South Dublin Bay and River Tolka Estuary SPA;
- Dalkey Islands SPA;
- The Murrough SPA;
- North-West Irish Sea SPA;
- Wicklow head SPA;
- North Bull Island SPA;
- Howth Head Island SPA;
- Baldoyle Bay SPA;
- Ireland's Eye SPA;
- Wicklow Mountains SPA;
- Malahide Estuary SPA;
- Lambay Island SPA;
- Rockabill SPA;
- River Nanny Estuary and Shore SPA;
- Skerries Islands SPA;
- Seas off Wexford SPA;
- Dundalk Bay SPA; and
- Wexford Harbour and Slobs SPA.

For Marine Mammals and Annex II Species

- Rockabill to Dalkey Island SAC;
- Codling Fault Zone SAC;
- Lambay Island SAC;

- Blackwater Bank SAC;
- Carnsore Point SAC;
- Hook Head SAC;
- North Anglesey Marine SAC;
- West Wales Marine SAC;
- North Channel SAC;
- Bristol Channel Approaches SAC;
- Lleyn Peninsula and the Sarnau SAC; and
- Cardigan Bay SAC.

For Coastal and Marine Habitats

- Rockabill to Dalkey Island SAC;
- South Dublin Bay SAC; and
- Wicklow Reef SAC.

This NIS has examined and analysed, in light of the best scientific knowledge, with respect to the sites assessed in this report, the identified impact sources and pathways, how these could impact on the sites' Qualifying Interests and COs and whether the predicted impacts would adversely affect the integrity of the Natura 2000 sites, or, in the case of SACs and SPAs in the UK, those sites now protected as part of the Emerald Network under the Bern Convention; these sites are assessed on a parallel basis as they existed as part of the Natura 2000 network and remain ecologically part of a network albeit with a different legal status.

Mitigation measures are set out in detail, and they ensure that any impacts on the COs of the Natura 2000 sites will be avoided during the Proposed Activities, such that there will be no risk of adverse effects on their integrity.

It has been objectively concluded following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the Proposed Activities and the implementation of specific mitigation measures where appropriate, that the Proposed Activities will not pose a risk of adversely affecting (either directly or indirectly) the integrity of any Natura 2000 site either alone or in combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion.

It is therefore concluded that the Proposed Activities will not have a significant adverse impact on the Natura 2000 sites, either alone or in combination with other plans or projects.

Accordingly, the NIS contains information which MARA, as competent authority, may consider in making its own complete, precise and definitive findings and conclusions and upon which MARA is capable of determining that all reasonable scientific doubt has been removed as to the effects of the Proposed Activities on the integrity of the relevant Natura 2000 sites.

In the light of the conclusions of the assessment which it shall conduct on the implications for the Natura 2000 sites concerned, the relevant public authority is enabled to ascertain that the Proposed Activities will not adversely affect the integrity of any Natura 2000 site.

2 INTRODUCTION

2.1 The Project

Codling Wind Park (CWP) is a proposed offshore wind farm (OWF) in the Irish Sea, set in an area called Codling Bank, between approximately 13-22 kilometres (km) off the County Wicklow coast, between Greystones and Wicklow Town.

Codling Wind Park Limited (CWPL), have applied for a Maritime Usage Licence (MUL) from the Maritime Area Regulatory Authority (MARA) under the Maritime Area Planning Act (2021), to undertake Site Investigation Activities to inform the detailed design stage of the proposed CWP Project. The MUL application was submitted to MARA on 24th May 2024. This Natura Impact Statement (NIS) Report has been prepared in support of the MUL application and will be submitted to MARA post Appropriate Assessment (AA) screening determination. The application also comprises an Assessment of Impact of the Maritime Usage (AIMU) report (document reference CWP-CWP-CON-02-01-09-REP-0001), an Annex IV Risk Assessment (document reference CWP-CWP-CON-02-01-09-ASM-0002 and a Supporting Information: Screening for Appropriate Assessment (SISAA) Report (document reference CWP-CWP-CON-02-01-09-ASM-0001).

The Licence Application Area (Appendix B – Figures, Figure 1) lies off the east coast of Ireland, spanning from the Poolbeg Peninsula on the east side of Dublin city to Wicklow Town, and is contained entirely within Ireland's National Marine Planning Framework (NMPF) Area and Irish Exclusive Economic Zone (EEZ), both of which extend 200 miles (320 km) off the Irish coast. The Licence Application Area, hereafter referred to as the "Licence Area", comprises an area of circa 477 km^2 and includes the array area, a potential operation and maintenance base (OMB) at Wicklow Harbour, the proposed export cable corridor (ECC) and the potential reclamation area for the proposed onshore substation along the northern shore of the Poolbeg Peninsula at Pigeon Park. The Licence Area accounts for all locations where site investigations are proposed as part of this Maritime Usage Licence Application.

The Site Investigation Activities, hereafter referred to as the "Proposed Activities" will include marine geophysical, hydrographic, geotechnical, benthic subtidal and intertidal ecological, environmental, metocean, and archaeological surveys. The Proposed Activities are outlined within Section 3 of this NIS. Further details of the Proposed Activities are contained within the AIMU report which accompanies this application.

In accordance with the requirements set out under Article 6(3) and 6(4) of the Habitats Directive (92/42/EEC), this NIS report presents the information necessary for the MARA to reach a Stage 2 AA Determination in relation to the Proposed Activities.

GoBe Consultants Ltd (GoBe) have been appointed by CWPL to assist in the collation of the Maritime Usage Licence Application (MULA). GoBe has been at the forefront of strategic planning, consenting and EIA for large scale offshore wind within the UK and have been actively applying our experience to the offshore wind farm market in Ireland. Our understanding of the requirements of the EIA and AA processes will be applied to this MULA.

GoBe have prepared this NIS report. All GoBe staff have experience of the preparation of information to support AAs and EIA. Contributors to the report include [redacted]

2.2 The Developer

Codling Wind Park Limited (CWPL), a joint venture between Fred. Olsen Seawind and Électricité de France (EDF) Renewables, was established to develop Codling Wind Park. Both companies are leading developers, owners, and operators of renewable energy assets, with many years of global experience in the renewable energy and offshore wind sector.

The Purpose of this Document

The purpose of this document, which accompanies the MULA, is to present the NIS to support the Competent Authority in its AA Determination.

Preparation of a NIS is required for Stage 2 of the AA process. In the case of the Proposed Activities, following AA screening, a NIS is required where it cannot be excluded, on the basis of objective information (without the implementation of mitigation measures), that Proposed Activities, individually or in combination with other plans or projects, will have a LSE on any Natura 2000 site which comprises of SACs or SPAs. The purpose of the NIS is to provide a scientific examination of the Proposed Activities and any relevant Natura 2000 sites, to identify and characterise any possible implications of the Proposed Activities, either alone or in-combination with other projects or plans, on the integrity of Natura 2000 sites where LSE could not be ruled out at Screening stage in view of the site's COs. COs are targets and requirements set by relevant Statutory Nature Conservation Bodies (SNCBs) to assess and maintain or improve the condition of the Natura 2000 site. The NIS contains the information necessary for MARA to carry out an AA.

The Office of the Planning Regulator issued a practice note on AA Screening for development proposals (Office of the Planning Regulator, 2021). The Practice Note outlines the steps and matters to be considered during the AA screening process. In line with the Office of the Planning Regulator's practice note, and the European Commission's Methodological Guidance on Articles 6(3) and (4) of the Habitats Directive (European Commission 2019, European Commission 2021), the following stages and steps have been undertaken to provide information for AA:

• Stage 1 – AA screening: Screening is the process that addresses and records the reasoning and conclusions in relation to the first two tests of Article 6(3), which are:

i) whether a plan or project is directly connected to, or necessary for, the management of the site; and

ii) whether a plan or project, alone or in combination with other plans and projects, is likely to have a significant effect on a Natura 2000 site in view of its COs.

- Step 1 – provide a description of the plan or project, and local site or plan area characteristics;
- Step 2 – ascertain the locations of the relevant Natura 2000 sites and compile information on the Qualifying Interests (QIs)/Special Conservation Interests (SCIs) and COs for the sites;
- Step 3 – assessment of likely significant effects (direct, indirect and cumulative), undertaken on the basis of available information as a desk study, field survey or primary research, as necessary;
- Step 4 – consideration of 'in combination effects'; and
- Step 5 – draw conclusion as to whether or not the project (either alone or in combination with other plans or projects) may give rise to significant effects, outlined within an AA Screening Statement.

If the effects are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated, then the process must proceed to Stage 2 AA.

- Stage 2 – AA: This stage considers whether the plan or project, alone or in combination with other projects or plans, will have adverse effects on the integrity of a Natura 2000 site, and includes any mitigation measures necessary to avoid, reduce or offset negative effects. The proponent of the plan or project will be required to submit a NIS, i.e., the report of a targeted professional scientific examination of the plan or project and the relevant Natura 2000 sites, to identify and characterise any possible implications for the site, in view of the site's SCIs, QIs and COs, taking account of in combination effects. This should provide information to enable the competent authority to carry out the AA. If the assessment is negative, i.e. adverse effects on the integrity of a site cannot be excluded, then the process must proceed through Stage 3: Alternative Solutions (where applicable), down to Stage 4: Imperative Reasons of Overriding Public Interest (IROPI), or the plan or project should be abandoned. It is the competent authority's responsibility to complete and record the AA. The overall assessment process includes the gathering and consideration of data and information relating to the plan or project and the site, the key elements of which should be contained in the NIS, in addition to data and information from other sources, and opinions from stakeholders, such as nature conservation authorities and relevant Non-Governmental Organisations (NGOs).

    - Step 1 – preparation of a Natura Impact Statement (this document).

The MUL and the NIS contained within this report covers all site investigation and baseline surveys within and outside the 12 NM limit as per the red-line boundary, to ensure all potential effects on the Natura 2000 Network are identified and assessed.

In Ireland, a site-specific CO aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

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

The favourable conservation status 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.

2.3 Stakeholder Engagement

The CWP Project team is committed to actively informing and engaging with interested groups and the public, in line with international best practise for project development. CWPL's primary engagement objective has always been to ensure that stakeholder engagement is conducted in an open, transparent, and inclusive manner.

A key focus is to provide all stakeholders, including inter alia communities and fishers, with a clear and authentic representation of the project at each stage of development. CWPL has a well-resourced communications and stakeholder and engagement team to proactively liaise and engage with communities, fishers, along with the key statutory and non-statutory bodies,

An experienced fisheries liaison officer (FLO) was appointed by CWPL in April 2020 to regularly engage and consult with the fishing industry. The FLO is currently ensuring that fishers are kept well informed of activities in a timely and constructive manner. In addition, CWPL are also carrying out engagement through consultation with lead fisheries organisations and with the wider marine community.

Engagement activities include; face to face meetings, online meetings, regular project leaflets and public exhibitions. The CWP website (codlingwindpark.ie) is kept up to date with newsletters, marine notices, and other consultation material.

In relation to this Marine Usage Licence Application, CWPL have so far corresponded with the following organisations;

- MARA
- Commission for Regulation of Utilities (Commission for Energy Regulation);
- Arklow Harbour;
- Bray Harbour;
- Commissioners of Irish Lights;
- Department of Housing, Local Government and Heritage;
- Dublin City Council;
- Dublin Port;
- Dún Laoghaire-Rathdown County Council;
- Dun Laoghaire Harbour;
- EirGrid;
- Environmental Protection Agency;
- Local Fishers and associating organisations (RIFFs etc)
- Greystones Harbour Marina;
- Howth Harbour;
- Inland Fisheries Ireland ;
- Irish Aviation Authority ;
- Marine Institute ;
- Marine Survey Office ;
- National Monuments Service;
- National Parks and Wildlife Service;
- Office of Public Works;
- Sea Fisheries Protection Authority;
- Wicklow County Council; and
- Wicklow Harbour.

CWPL has also held pre-application consultation meetings with a range of bodies on the project and the scope of the proposed surveys. Meetings have been held with MARA, the Marine Institute, Inland Fisheries Ireland, Marine Survey Office, Commissioner for Irish Lights, and the National Monument Services.

These discussions have guided the information contained within this application, the supporting reports and has informed the finalisation of the proposed survey methodologies.

CWPL will continue to engage with MARA and other relevant stakeholders where appropriate prior to the commencement of the Proposed Activities.

3 PROPOSED ACTIVITIES

This document has been produced to support a MULA, which seeks consent to conduct the Proposed Activities to inform the development and detailed design of the CWP OWF off the coast of Co. Wicklow, alongside the potential OMB at Wicklow Harbour, the ECC and the potential onshore substation location along the northern shore of the Poolbeg Peninsula. This is not an application for a wind farm development.

3.1 Licence Area

The proposed Licence Area lies off the east coast of Ireland spanning from the Poolbeg Peninsula on the east side of Dublin city to Wicklow Town and is within Ireland's NMPF area and Irish Exclusive Economic Zone (EEZ), both of which extend 320 km (200 miles) from the Irish coast. The Licence Area covers a total area of 477 km^2 and is comprised of the proposed OWF area, potential OMB at Wicklow Harbour, proposed reclamation area at the potential onshore substation area for the onshore substation, and the proposed ECC (Figure 1).

3.2 Purpose of Proposed Activities

The objectives of the Proposed Activities are to determine the environmental conditions, and the seafloor and subsurface geological characteristics within the Licence Area in advance of construction, to inform the detailed design phase at CWP OWF. Site-specific data is needed to provide additional geotechnical, geophysical, environmental, and metocean information. Once gathered, this data will be used to inform detailed design decisions about foundation type, sizing, installation methodology, cable routing, methodology for laying and burying cables, cable landfall site selection, and to verify the validity of previously acquired data in light of the changing marine environment. The proposed programme of Proposed Activities to be undertaken within the Licence Area is summarised in Table 3.1 below and discussed in more detail in Section 3.3.

3.3 Survey Summary

As part of the Proposed Activities, two forms of site investigation survey are proposed: remote sensing activities (e.g. geophysical survey) which typically do not contact the seabed, and direct sampling activities (e.g. geotechnical survey) which will directly interact with the seabed. All Proposed Activities will be undertaken within the Licence Area shown in Figure 2.

The geophysical survey data to be collected as part of the Proposed Activities will subsequently be analysed, the results of which will be used to inform the precise locations where the direct sampling and tests will take place (within the Licence Area). Historical geophysical data from previous foreshore licences may also be used to inform the direct sampling locations. For this reason, it has been necessary to consider, and present, indicative sampling locations within this document. This approach also allows for any site specific considerations (such as physical obstructions) to be avoided or taken into account at the time of carrying out the sampling/test.

CWPL are applying for a licence of 5-year duration to allow for flexibility to accommodate any unforeseen delays and breaks within the Proposed Activities campaigns.

The Proposed Activities will include:

- Metocean and Floating Light Detection And Ranging (LiDAR) campaign
- Geophysical campaign and Un-Exploded Ordinance (UXO) surveys;
- Geotechnical campaign;
- Fish & Shellfish surveys;
- Benthic & Intertidal surveys;

- Marine Mammal Passive Acoustic Monitoring (PAM) survey; and
- Archaeological surveys.

A summary of Proposed Activities is presented in Table 3.1 below and high-level method statements of the Proposed Activities are outlined in Section 3.3 below. Full details of the Proposed Activities can be found within the AIMU report (CWP-CWP-CON-02-01-09-Rep-001) submitted as part of this MUL application. Indicative proposed sampling locations are provided in Appendix B – Figures, Figure 2, Figure 3 and Figure 4. This is illustrative and may be subject to change depending on the final design and outcome of any consultation and agreements reached with statutory bodies or consultees. Timings are also indicative and dependent on various factors including but not limited to weather and timing restrictions.

The information contained within Section 3.4 is indicative and may be subject to change depending on the final design and outcome of any consultation and agreements reached with statutory bodies or consultees. Timings for the Proposed Activities are also indicative and dependent on various factors including but not limited to weather and other environmental restrictions. Notwithstanding this, the details provided in this document are considered sufficient to inform a robust assessment of the Proposed Activities. A precautionary approach has been taken to ensure that the maximum impact is assessed where uncertainty exists over the precise timing or details of the Proposed Activities.

All efforts will be made to follow survey recommendations outlined in the Guidance on Marine Baseline Ecological Assessments & Monitoring Activities for Offshore Renewable Energy Projects Part 1 and 2 (Department of Communications, Climate Action, and the Environment (DCCAE), April 2018).

Table 3.1 Summary of Proposed Activities and Indicative Programme.

Proposed Activity	Proposed Sample Numbers / Locations	Indicative Timings
Metocean surveys	**Floating LIDAR system (FLS)** ▪ Up to two devices to be deployed at any one time for up to 36 months deployment (indicative locations are shown in Figure 2, Appendix B – Figures. **Wave Buoys or MetOcean Buoys** ▪ Up to two wave or MetOcean buoys located within the array area or along the export cable route. Predicted to use a clump weight anchors or drag anchors. Mooring can be single point or two-point mooring for systems. Buoys up to approximately 3 m diameter. **Acoustic Doppler Current Profilers (ADCPs)** ▪ Up to two ADCPs placed on the seabed located within the array site or along the proposed export cable corridor (ECC).	Fixed 12 to 36 months period including the need for site access for data collection and servicing as required.
Geotechnical surveys	Indicatively 271 proposed survey locations have been identified across the Licence Area (including the Array Area, ECC, OMB and proposed onshore substation location) which may require the use of boreholes, co-located Cone Penetration Tests (CPTs), and vibrocores (VCs), and may require multiple mobilisations. Trial pits will be used at the intertidal landfall area. The test locations are yet to be determined and will be informed by prior surveys, detailed engineering, and project design. Indicative locations for geotechnical tests	Two to eight months per mobilisation.

Proposed Activity	Proposed Sample Numbers / Locations	Indicative Timings
	within the Licence Area are provided in Figure 3 in Appendix B – Figures. **Proposed Array Area** A conservative approach has been adopted which considers a maximum of 203 geotechnical survey locations consisting of up to 125 boreholes and up to 78 co-located CPTs and VCs. These are maximum figures (see Figure 3). The most likely numbers of geotechnical survey locations will be significantly lower. (i.e. likely 60 or 75 boreholes to correspond with wind turbine generator (WTG) layouts with 78 co-located CPTs/VCs) Borehole indicative depths: 50 m. The maximum casing diameter of a borehole is typically 508 mm. The diameter of sample recovered is approximately 105mm. Therefore, the maximum seabed footprint from the boreholes within the array area is circa 25 $m^{2.}$ CPT and VC indicative depths: 6 m. CPT cone is approximately 50 mm in diameter housed within a seabed frame with a footprint of between 8-10 m^2. With a maximum of 78 locations, the maximum seabed footprint over the proposed array area is less than one m2 for the CPT cones and 780 m^2 for the seabed frame. Vibrocore typically has an outer diameter of 100-120 mm, with an expected sample recovery of 96 mm. With a maximum of 78 locations, the maximum seabed footprint over the proposed array area is less than one m^2. **Proposed Export cable corridor and intertidal landfall area** A conservative approach has been adopted which considers a maximum of 48 geotechnical survey locations in the ECC. Indicative depths: 6 m with few extending to 12 m close to the proposed intertidal landfall area. Diameter of casings and recovered samples for BHs and VCs and CPTs within the ECC are the same specifications as for the array area. Seven trial pits at the proposed intertidal landfall area. Indicative sampling duration is < 12 hours. **Potential Operation and Maintenance Base (OMB)** Ten boreholes and ten CPTs. Borehole indicative depths: 6 m. CPT and VC indicative depths: 6 m.	

Proposed Activity	Proposed Sample Numbers / Locations	Indicative Timings
	Diameter of casings and recovered samples for boreholes, VCs, and CPTs within the potential OMB are the same specifications as for the proposed array area. Indicative locations are shown in Figure 2 and Figure 3. **Proposed Onshore Substation Location** Ten boreholes and ten CPT/VCs. Borehole indicative depths: 12 m. CPT and VC indicative depths: 6 m. Diameter of casings and recovered samples for boreholes, VCs, and CPTs within the potential onshore substation location are the same specifications as for the proposed array area. Indicative locations are shown in in Figure 2 and Figure 3.	
Geophysical and unexploded ordnance (UXO) surveys	**Proposed Array Area** Surveys across the proposed array area to assess ground conditions and to identify possible UXOs. Techniques include Multibeam echosounder (MBES), side scan sonar (SSS), and a gradiometer system using several magnetometers, a sub bottom profiler (SBP), and multichannel high-resolution acoustic seismic surveys i.e., sparkers. Ultra Short Base Line (USBL), an underwater acoustic positioning system will be used for towed equipment. **Proposed Export cable corridor & Operation and Maintenance Base** Surveys across ECC and OMB to assess ground conditions and to identify possible UXOs. Techniques include MBES, SSS, and a gradiometer system using several magnetometers, a sub bottom profiler, and multichannel high-resolution acoustic seismic surveys i.e., sparkers. USBL will be used for towed equipment. **Proposed onshore substation location** Surveys in Pigeon Park to assess ground conditions. Techniques include MBES, SSS, and a gradiometer system using several magnetometers, a sub bottom profiler, and multichannel high-resolution acoustic seismic surveys i.e., sparkers.	Two to eight months per mobilisation.

Proposed Activity	Proposed Sample Numbers / Locations	Indicative Timings
Fish & shellfish surveys	**Potting survey** Surveys will be designed to undertake investigative sampling. Indicatively may include ten locations for potting and trawl surveys within the proposed array area and/or along the proposed ECC and may be required at the proposed OMB. Approximate duration of survey is three days. Indicative sampling duration is 24 hours per station. **Trawl survey** Surveys will be designed to undertake investigative sampling. Indicatively may include ten locations for potting and trawl surveys within the proposed array area and/or along the proposed ECC and may be required at the proposed OMB. Indicative duration of survey is three days. Indicative sampling duration is one hour per station.	Periodically taking place over the following five year period. Potting surveys may be repeated up to quarterly; trawl survey sampling will occur no more than quarterly every annum. In total potting and trawl surveys will take approximately 4 weeks per year.
Benthic & intertidal surveys	**Benthic sampling** Benthic sampling will occur up to two times annually. Indicative duration of survey is five days (likely using a 0.1 m^2 mini Hamon grab, Day grab, or a Van-Veen grab). Up to 60 across the proposed array area. Up to 20 reference sites (see Figure 4 for indicative locations). Up to 20 along the proposed ECC up to mean high water springs (MHWS). Up to 10 around Wicklow Harbour for the proposed OMB. Drop down videos (DDVs) may also be deployed at the same locations as the grab samples. Indicative locations are shown in Figure 4**.** Indicative sampling duration is < one hour per station. Note – grabs may be required to inform a potential Dumping at Sea Permit application. **Ecological intertidal walkover survey** One at the proposed intertidal landfall area per year. Includes a Phase I walkover survey and a Phase II quantitative intertidal study to derive information on a range of environmental, biological, and ecological features (biotopes, extent of sub-features, zonation, *etc.*). In total, the Phase II quantitative survey will survey a total of six shore height stations, resulting in 18 faunal core samples and 6 sediment samples for physical and chemical analysis. Indicative sampling duration is < one hour per station.	Periodically taking place over the following 5-year period. The survey duration will be approximately 3 weeks per year.

Proposed Activity	Proposed Sample Numbers / Locations	Indicative Timings
	Epibenthic Trawls Indicative 30 locations within proposed array area and/or along the proposed ECC. Single survey to establish baseline, and possibly repeated over several mobilisations Indicative duration of survey is two days. Indicative sampling duration is one hour per station.	
Marine mammal acoustics	**Echolocation click detectors (PODs) and potentially broadband sound recorders.** A maximum of eight moorings equally dispersed outside of the array area boundary, but within the Licensed Area. Indicative locations are shown in Figure 2 in Appendix B – Figures.	Fixed 12 to 36 month period including the need for site access for data collection and servicing as required.
Intertidal archaeological walkover survey	Metal detector survey for archaeology at the proposed intertidal landfall area. Walkover at the proposed intertidal landfall area for archaeological features of interest.	Periodically taking place over the following 5-year period. Approximately 1 week per year.

3.4 Survey Methodologies

High-level method statements and types of equipment that will be used during the Proposed Activities are provided below. The proposed programme of site investigations to be undertaken within the Licence Area is described in detail in the Description of the Proposed Activities section of the Assessment of Impacts on the Maritime Usage (AIMU) document submitted as part of this licence application.

3.4.1 Metocean

The metocean campaign across the Licence Area will comprise the deployment of:

- Up to two Floating LiDAR System (FLS) units for wind measurements, which is used to map the topography of the seabed;
- Acoustic Doppler Current Profilers (ADCPs) placed on the seabed for subsurface wave and current measurements, which are used to measure water current velocities over a depth range using the Doppler effect of sound waves scattered back from particles within the water column; or
- Waverider Buoys and/or MetOcean Buoys, used to measure wave data such as height and spread.

3.4.2 Geophysical Survey

The geophysical surveys across the Licence Area will comprise of the following:

- Multibeam Echosounders (MBES), which is used to provide detailed bathymetric mapping of the seabed;
- Sidescan Sonar (SSS), which is used to image the surface of the seabed for the detection of objects or structures;

- Sub-bottom Profiling (SBP)/Ultra-High resolution seismic (UHRS), which is used to produce a 2D image of the sub seabed geology;
- Marine Magnetometry/Gradiometer, used to locate and identify ferrous objects on or buried in the seabed; and
- Remotely Operated Vehicle (ROV), which is used to inspect certain areas of the proposed ECC or areas where there are features of interest within the proposed array area. An Ultra Short Base Line (USBL) system may be used to communicate the ROV's position relative to the vessel.

3.4.3 Geotechnical Survey

The 271 geotechnical survey locations across the Licence Area campaign will comprise:

- Cone Penetration Testing (CPT), a method of mapping and testing soil profiles on the seabed;
- Boreholes, a method of collecting sample from the seabed;
- Vibrocores (VCs), a method of rapidly retrieving continuous, undisturbed core samples from unconsolidated and semi-consolidated sediments; and
- Trial pits, a method of intrusive ground investigation for determining the condition and composition of the sediment. An estimation of seven trial pits to be used at the proposed intertidal landfall area for a duration of < 12 hrs.

Within the array area, there will be a maximum of 203 geotechnical locations consisting of up to 125 Boreholes and up to 78 co-located CPTs and VCs. These are maximum figures (please refer to Figure 3). The most likely numbers will be significantly lower (i.e. 60 or 75 boreholes to correspond with WTG layouts and 78 co-located CPTs/VCs). Along the ECC and intertidal landfall area there will be a maximum of 48 geotechnical locations, whilst there will be a maximum of 10 co-located boreholes and CPTs at both the potential OMB, and the Proposed Onshore Substation Location.

3.4.4 Fish and Shellfish Survey

The fish or shellfish, surveys methods across the Licence Area are as follows:

- Potting survey, comprising fleets of pots (e.g. lobster pots) comparable with those used by local fishermen will be set over the Licence Area; and
- Trawl survey, the trawl survey would use comparable gear to that used locally. The sampling will occur no more than quarterly throughout the year. An estimated 10 locations for potting and trawl surveys within the proposed array area and/or along the proposed ECC and may be required at the proposed OMB.

3.4.5 Benthic and Intertidal Survey

The benthic survey will be designed using analysis of the geophysical survey data available which will be reviewed to stratify sampling according to likely habitat types across the Licence Area.

Survey techniques are likely to include:

- Drop Down Video (DDV) at stations where sensitive habitats or hard substrate may be found;
- Deployment of a 0.1 m² mini Hamon grab, Day grab, or a Van-Veen grab) at sediment-based sampling stations;
- Epibenthic Beam Trawl (if required following geophysical and DDV results); and

- Intertidal walkover survey.

3.4.6 Marine Mammal Passive Acoustic Monitoring (PAM) Survey

PAM will be conducted in order to determine baseline levels of dolphin/porpoise echolocation click occurrence and/or to collect data on background noise levels and other vocalisations made by cetaceans (e.g., whistles) across the Licence Area.

Two different types of equipment may be used to collect marine mammal acoustics data:

- Echolocation click detectors (e.g., Chelonia's F-PODs); and
- Broadband sound recorders (e.g., Wildlife Acoustics' SM2M).

3.4.7 Archaeological Surveys

The archaeological surveys will be confirmed through the CWPL tendering process in consultation with the National Monuments service (NMS); however, it is proposed that two survey methods are utilised across the Licence Area:

- Intertidal walkover survey, which is used to survey and record visible archaeological remains within the intertidal zone; and
- A metal detection survey, which is used to detect metallic objects that may be buried below the surface layers of the intertidal zone.

A Detection Device Survey Licence will be applied for from the NMS prior to the surveys being undertaken.

3.4.8 Survey Vessels

In order to undertake these Proposed Activities, at any one time up to 8 survey vessels may be mobilised with a suite of survey equipment and devices within the Licence Area. A variety of survey vessels will be used. Vessels for geophysical surveys are generally between 10-60 m in length and are also suitable for environmental surveys. For deeper water and geotechnical surveys larger 30-90 m vessels may be required. For borehole operations, jack-up barges may be used in order to maintain position. The exact vessel types will be defined after the tender process has been completed.

The vessels will conform to the following minimum requirements as appropriate:

- Endurance (e.g. fuel, water, stores, etc.) to undertake the required Proposed Activities;
- Appropriate accommodation and messing facilities on board;
- Station-keeping and sea keeping capabilities required by the specified work at the proposed time of year; the appointed contractor may provide supplemental tug assistance if such assistance benefits the operation;
- Staffing to allow all planned work to be carried out as a continuous operation (on a 24 hour per day basis for the offshore activities and on a 12 hour per day basis for the nearshore activities); and
- Equipment and spares with necessary tools for all specified Proposed Activities.
- In instances where guard vessels and crew transfer / support vessels are required alongside survey vessels, it is possible that up to 15 vessels may be deployed at any one time.

4 SUMMARY OF SUPPORTING INFORMATION FOR SCREENING FOR APPROPRIATE ASSESSMENT

The Supporting Information for Screening Appropriate Assessment (SISAA) was submitted to MARA and has been subsequently reviewed and updated based on the Screening Opinion received from MARA in addition to further scientific information. The below sections detail the conclusions associated with the sites screened in SISAA, followed by any updates implemented since receipt of the Screening Opinion. For justification for sites screened out within the SISAA, please refer to the SISAA.

4.1 Marine Ornithology

4.1.1 Screening Results

The following table summarises the designated sites, qualifying interests and impacts that were concluded to likely have a significant effect within the SISAA. Please note that the impact "*Litter and pollution*" is considered functionally the same as "*Water quality deterioration from accidental incidents with survey vessels*" impact that MARA has screened in within their Screening opinion. The sites are presented in Figure 5, in Appendix B – Figures.

Table 4.1: Marine Ornithology QIs Screened in for Potential for LSE

SPA (sites with * are subject to screening updates in Section 4.1.2)	Distance from MULA (km)	QI	Impact
South Dublin Bay and River Tolka Estuary SPA [IE004024]*	Within	Light-bellied Brent goose – non-breeding Sanderling – non-breeding Dunlin – non-breeding Knot – non-breeding Ringed plover – non-breeding Oystercatcher – non-breeding Bar-tailed godwit – non-breeding Grey plover – non-breeding[1] Redshank – non-breeding Black-headed gull – non-breeding Roseate tern – non-breeding Common tern – breeding & non-breeding Arctic tern – breeding & non-breeding	Above-water noise; Underwater noise; Visual impacts; and Litter and pollution.

[1] This feature has been proposed to be removed from the qualifying features of the site by NPWS and does not have conservation objectives.

SPA (sites with * are subject to screening updates in Section 4.1.2)	Distance from MULA (km)	QI	Impact
The Murrough SPA [IE004186]	Adjacent	Teal – non-breeding Wigeon – non-breeding Greylag goose – non-breeding Light-bellied Brent goose – non-breeding Herring gull – non-breeding Black-headed gull – non-breeding Red throated diver – non-breeding Little tern - breeding	Above-water noise; Underwater noise; Visual impacts; and Litter and pollution.
Dalkey Islands SPA [IE004172]	0.29	Roseate tern – breeding & non-breeding Common tern – breeding & non-breeding Arctic tern – breeding & non-breeding	Above-water noise; Underwater noise; Visual impacts; and Litter and pollution.
North-West Irish Sea SPA [IE004236]	0.55	Red-throated diver – non-breeding Great northern diver – non-breeding Fulmar – breeding Manx shearwater – breeding Cormorant – non-breeding Shag – breeding Common scoter – breeding Black-headed gull – non-breeding Common gull – non-breeding Lesser black-backed gull – breeding Herring gull – breeding Great black-backed gull – non-breeding Kittiwake – breeding Guillemot – breeding Razorbill – breeding Puffin – breeding Little gull – non-breeding Little tern – breeding Roseate tern – breeding Common tern – breeding Arctic tern – breeding	Above-water noise; Underwater noise; Visual impacts; and Litter and pollution.

SPA (sites with * are subject to screening updates in Section 4.1.2)	Distance from MULA (km)	QI	Impact
North Bull Island SPA [IE004006]	0.76	Light-bellied Brent goose – non-breeding Shelduck – non-breeding Shoveler – non-breeding Pintail – non-breeding Teal – non-breeding Oystercatcher – non-breeding Golden plover – non-breeding Grey plover – non-breeding Curlew – non-breeding Bar-tailed godwit – non-breeding Black-tailed godwit – non-breeding Turnstone – non-breeding Knot – non-breeding Sanderling – non-breeding Dunlin – non-breeding Redshank – non-breeding Black-headed gull – non-breeding	Above-water noise; Underwater noise; Visual impacts; and Litter and pollution.
Wicklow Head SPA [IE004127]	4.85	Kittiwake – breeding	Above-water noise; Underwater noise; Visual impacts; and Litter and pollution.
Howth Head Coast SPA [IE004113]	4.95	Kittiwake – breeding	Above-water noise; Underwater noise; Visual impacts; and Litter and pollution.
Ireland's Eye SPA [IE004117]	9.92	Herring gull – breeding & non-breeding Kittiwake – breeding & non-breeding Cormorant – breeding & non-breeding Guillemot – breeding & non-breeding Razorbill – breeding & non-breeding	Above-water noise; Underwater noise; Visual impacts; and Litter and pollution.
Baldoyle Bay SPA [IE004016]	12.50	Light-bellied Brent goose – non-breeding Shelduck – non-breeding Ringed plover – non-breeding Golden plover – non-breeding Grey plover – non-breeding Bar-tailed godwit – non-breeding	Above-water noise; Visual impacts; and Litter and pollution.
Wicklow Mountains SPA [IE004040]	13.10	Merlin – breeding & non-breeding Peregrin – breeding & non-breeding	Litter and pollution.

SPA (sites with * are subject to screening updates in Section 4.1.2)	Distance from MULA (km)	QI	Impact
Malahide Estuary SPA [IE004025]	14.98	Light-bellied Brent goose – non-breeding Shelduck – non-breeding Pintail – non-breeding Oystercatcher – non-breeding Golden plover – non-breeding Grey plover – non-breeding Knot – non-breeding Dunlin – non-breeding Black-tailed godwit – non-breeding Bar-tailed godwit – non-breeding Redshank – non-breeding	Above-water noise; Visual impacts; and Litter and pollution.
		Great crested grebe – non-breeding Goldeneye – non-breeding Red-breasted merganser – non-breeding	Above-water noise; Underwater noise; Visual impacts; and Litter and pollution.

4.1.2 Updates to Screening After Consultation

After the screening opinion was received from MARA a review of the screening approach was carried out. With consideration of the scale of the proposed activities and MARAs screening opinion, the screening has been updated to align more closely with the approach MARA has taken, resulting in a number of additional sites and species being screened in for assessment. Table 4.2 details the additional designated sites, the QIs and the impacts that are now screened in post consultation.

Table 4.2: Ornithology QIs and Sites Screened in After Consultation

SPA	Distance from MULA (km)	QI	Impact
South Dublin Bay and River Tolka Estuary SPA [IE004024]	Within	All species listed above; and Wetlands and Waterbirds	Habitat disturbance
Lambay Island SPA [IE004069]	18.97	Fulmar – breeding Herring gull – breeding & non-breeding Kittiwake – breeding Guillemot – breeding Razorbill – breeding Puffin – breeding	Above-water noise; Underwater noise; and Visual impacts
Rockabill SPA [IE004014]	29.12	Arctic tern – breeding Roseate tern – breeding Common tern – breeding	Above-water noise; and Visual impacts.

SPA	Distance from MULA (km)	QI	Impact
Skerries Islands SPA [IE004122]	29.41	Herring gull – breeding & non-breeding	Above-water noise; and Visual impacts.
River Nanny Estuary and Shore SPA [IE004158]	34.25	Herring gull –non-breeding	Above-water noise; and Visual impacts.
Seas off Wexford SPA [IE004237]	50.01	Fulmar – breeding Gannet – breeding Lesser black-backed gull – breeding Puffin – breeding Herring gull – breeding & non-breeding	Above-water noise; Underwater noise; and Visual impacts
Dundalk Bay SPA [IE004026]	57.71	Black-headed gull – non-breeding Common gull – non-breeding Herring gull – non-breeding	Above-water noise; and Visual impacts
Wexford Harbour and Slobs SPA [IE0004076]	65.02	Lesser black-backed gull – non-breeding	Underwater noise; and Visual impacts

4.2 Marine Mammals and Annex 2 species

4.2.1 Screening Results

The following summarises the designated sites, qualifying interests and impacts that were concluded to likely have a significant effect within the SISAA. Please note that the impact "*Mortality or reduced health/fitness resulting from litter or pollution arising from the Proposed Activities*" is considered functionally the same as "*Water quality deterioration from accidental incidents with survey vessels*" impact that MARA has screened in within their Screening opinion. The sites are presented in Figure 6, in Appendix B – Figures.

Table 4.3: Marine Mammal and Annex II Species QIs Screened in for Potential for LSE

SAC (sites with * are subject to screening updates in Section 4.2.2)	Distance from MULA (km)	QI	Impact
Rockabill to Dalkey Island SAC [IE003000]	Within	Harbour porpoise.	Permanent Threshold Shift (PTS), or Temporary Threshold Shift (TTS) from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.

SAC (sites with * are subject to screening updates in Section 4.2.2)	Distance from MULA (km)	QI	Impact
Codling Fault Zone SAC [IE003015]	14.2	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Wicklow Mountains SAC [IE002122]*	15.5	Otter	Disturbance and displacement from activities in the intertidal or shallow subtidal area (i.e. environmental, geophysical, or geotechnical surveys or nearshore area); Indirect effects through impacts upon prey species; and Mortality or reduced health/ fitness resulting from litter or pollution arising from the Proposed Activities.
Lambay Island SAC [IE000204]	18.97	Harbour porpoise; Harbour seal; and Grey seal.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
North Anglesey Marine SAC [UK0030398]	31.79	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Blackwater Bank SAC [IE002953]	52.61	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
West Wales Marine SAC [UK0030397]	53.30	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Lleyn Peninsula and the Sarnau SAC [UK0013117]	57.92	Bottlenose dolphin; and Grey seal.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.

SAC (sites with * are subject to screening updates in Section 4.2.2)	Distance from MULA (km)	QI	Impact
Carnsore Point SAC [IE002269]	84.78	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Cardigan Bay SAC [UK0012712]	97.98	Bottlenose dolphin; and Grey seal.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
North Channel SAC [UK0030399]	104.85	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Hook Head SAC [IE000764]	127.68	Harbour porpoise; and Bottlenose dolphin.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Bristol Channel Approaches SAC [UK0030396]	187.52	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Roaringwater Bay and Islands SAC [IE000101]*	334.52	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Kenmare River SAC [IE002158]*	384.89	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.

SAC (sites with * are subject to screening updates in Section 4.2.2)	Distance from MULA (km)	QI	Impact
Mers Celtiques – Talus du golfe de Gascogne [FR5302016]*	431.1	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Blasket Islands SAC [IE002172]*	447.63	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Nord Bretagne DH [FR2502022]*	461.2	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Belgica Mound Province SAC [IE002327]*	477.87	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Bunduff Lough & Machair/ Trawlua and Mullagh SAC [IE000625]*	481.85	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Ouessant-Molène [FR5300018]*	504	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Abers - Côte des legends [FR5300017]*	511.8	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.

SAC (sites with * are subject to screening updates in Section 4.2.2)	Distance from MULA (km)	QI	Impact
Côte de Granit rose-Sept-Iles [FR5300009]*	521.7	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Baie de Morlaix [FR5300015]*	525.8	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
West Connacht Coast SAC [IE002998]*	539.07	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Tregor Goëlo [FR5300010]*	540.6	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Côte de Crozon SAC [FR5302006]*	543.06	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Chaussée de Sein [FR5302007]*	552.2	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Inishmore Island SAC [IE000213]*	580.98	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.

SAC (sites with * are subject to screening updates in Section 4.2.2)	Distance from MULA (km)	QI	Impact
Kilkieran Bay and Islands SAC [IE002111]*	590.04	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Anse de Vauville SAC [FR2502019]*	610.92	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Baie de Saint-Brieuc – Est SAC [FR5300066]*	611.21	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Récifs et landes de la Hague SAC [FR2500084]*	619.93	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Banc et récifs de Surtainville SAC [FR2502018]*	621.44	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Chausey SAC [FR2510037]*	635.16	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.
Estuaire de la Rance SAC [FR5300061]*	647.32	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.

SAC (sites with * are subject to screening updates in Section 4.2.2)	Distance from MULA (km)	QI	Impact
Baie du Mont Saint-Michel SAC [FR2510048]*	667.79	Harbour porpoise.	PTS, or TTS from increased anthropogenic noise; Disturbance from increased anthropogenic noise; Mortality or injury from collision events (with vessels); and Mortality or reduced health/ fitness from pollution events or littering.

4.2.2 Updates to Screening After Consultation

After the screening opinion was received from MARA a review of the screening approach was carried out. With consideration of the scale of the proposed activities and MARAs screening opinion, the screening has been updated to align more closely with the approach MARA has taken in addition to considering additional scientific evidence.

For harbour porpoise, whilst the SAC and the MULA are located in the Celtic and Irish Sea MU, the maximum distance travelled per day by harbour porpoise is <200 km (Stalder et al., 2020), with most estimates in other literature significantly less. Based on this range, for sites >200 km away it is considered that individuals from the site will not be within the vicinity of the MULA area when activities are being undertaken, or any disturbance they experience would no longer be affecting them at the point of them arriving within the designated site as it would take longer than a day to reach. Therefore the following SACs listed in Table 4.4 have been screened out for harbour porpoise feature. The screening ranges for bottlenose dolphin has not been reviewed as all of the designated sites with them as qualifying interests within the MU are located within the 200 km harbour porpoise range.

For otter, Wicklow Mountains SAC is located inland from the coast with significant urban areas between the SAC and the locations of the proposed activities, it is concluded there is no pathway for effect on the otter QI as there are barrier to movement between the SAC and the proposed activities.

Table 4.4: Marine Mammals and Other Annex 2 QI Sites Screened out After Consultation

SAC	Distance from MULA (km)	QI screened out
Wicklow Mountains SAC [IE002122]	15.5	Otter
Roaringwater Bay and Islands SAC [IE000101]	334.52	Harbour porpoise.
Kenmare River SAC [IE002158]	384.89	Harbour porpoise.
Mers Celtiques – Talus du golfe de Gascogne [FR5302016]	431.1	Harbour porpoise.

SAC	Distance from MULA (km)	QI screened out
Blasket Islands SAC [IE002172]	447.63	Harbour porpoise.
Nord Bretagne DH [FR2502022]	461.2	Harbour porpoise.
Belgica Mound Province SAC [IE002327]	477.87	Harbour porpoise.
Bunduff Lough & Machair/ Trawlua and Mullagh SAC [IE000625]	481.85	Harbour porpoise.
Ouessant-Molène [FR5300018]	504	Harbour porpoise.
Abers - Côte des legends [FR5300017]	511.8	Harbour porpoise.
Côte de Granit rose-Sept-Iles [FR5300009]	521.7	Harbour porpoise.
Baie de Morlaix [FR5300015]	525.8	Harbour porpoise.
West Connacht Coast SAC [IE002998]	539.07	Harbour porpoise.
Tregor Goëlo [FR5300010]	540.6	Harbour porpoise.
Côte de Crozon SAC [FR5302006]	543.06	Harbour porpoise.
Chaussée de Sein [FR5302007]	552.2	Harbour porpoise.
Inishmore Island SAC [IE000213]	580.98	Harbour porpoise.
Kilkieran Bay and Islands SAC [IE002111]	590.04	Harbour porpoise.
Anse de Vauville SAC [FR2502019]	610.92	Harbour porpoise.
Baie de Saint-Brieuc – Est SAC [FR5300066]	611.21	Harbour porpoise.

SAC	Distance from MULA (km)	QI screened out
Récifs et landes de la Hague SAC [FR2500084]	619.93	Harbour porpoise.
Banc et récifs de Surtainville SAC [FR2502018]	621.44	Harbour porpoise.
Chausey SAC [FR2510037]	635.16	Harbour porpoise.
Estuaire de la Rance SAC [FR5300061]	647.32	Harbour porpoise.
Baie du Mont Saint-Michel SAC [FR2510048]	667.79	Harbour porpoise.

After consultation with MARA, Slaney River Valley SACs Harbour seal QI has been screened in for disturbance from underwater noise and is 77.01km from the proposed activities.

4.3 Annex I Habitats

4.3.1 Screening Results

The following summarises the designated sites, qualifying interests and impacts that were concluded to likely have a significant effect within the SISAA. The sites are presented in Figure 7, in Appendix B – Figures.

Table 4.5: Annex I Habitats Screened in for Potential LSE

SAC (sites with * are subject to screening updates in Section 4.3.2)	Distance from MULA (km)	QI	Impact
Rockabill to Dalkey Island SAC [IE0003000]	Within	Reefs.	Direct physical disturbance; Increase in SSC/ smothering; Community changes relating to increases in contaminated sediments; Community or habitat change arising from introduction of Invasive Non-Native Species (INNS); and Community or habitat change arising from littering or pollution events.

SAC (sites with * are subject to screening updates in Section 4.3.2)	Distance from MULA (km)	QI	Impact
Wicklow Reef SAC [IE002274]	0	Reefs.	Direct physical disturbance; Increase in SSC/ smothering; Community changes relating to increases in contaminated sediments; Community or habitat change arising from introduction of INNS; and Community or habitat change arising from littering or pollution events.
South Dublin Bay SAC [IE000210]	0	Mudflats and sandflats not covered by seawater at low tide; Annual vegetation of drift lines; Salicornia and other annuals colonizing mud and sand; and Embryonic shifting dunes.	Direct physical disturbance; Increase in SSC/ smothering; Community changes relating to increases in contaminated sediments; Community or habitat change arising from introduction of INNS; and Community or habitat change arising from littering or pollution events.
North Dublin Bay SAC [IE000206]*	0.76	Mudflats and sandflats not covered by seawater at low tide; Annual vegetation of drift lines; Salicornia and other annuals colonizing mud and sand; Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*); Mediterranean salt meadows (*Juncetalia maritimae*); Embryonic shifting dunes; Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes); Fixed coastal dunes with herbaceous vegetation (grey dunes); Humid dune slacks; Petalwort (*Petalophyllum ralfsii*).	Direct physical disturbance; Increase in SSC/ smothering; Community changes relating to increases in contaminated sediments; Community or habitat change arising from introduction of INNS; and Community or habitat change arising from littering or pollution events.

SAC (sites with * are subject to screening updates in Section 4.3.2)	Distance from MULA (km)	QI	Impact
Murrough Wetlands SAC [IE002249]*	1.01	Annual vegetation of drift lines; Perennial vegetation of stony banks; Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*); Mediterranean salt meadows (*Juncetalia maritime*); Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*; and Alkaline fens.	Increase in SSC/ smothering; Community changes relating to increases in contaminated sediments; Community or habitat change arising from introduction of INNS; and Community or habitat change arising from littering or pollution events.

4.3.2 Updates to Screening After Consultation

After the screening opinion was received from MARA a review of the screening approach was carried out. With consideration of the scale of the proposed activities in addition to further information associated with them, and MARAs screening opinion, the screening has been updated and now aligns more closely with the approach MARA has taken.

Further information has resulted in a review of the screening for North Dublin Bay SAC, activities associated with the MULA will not require access through the SAC, and consequently there is no potential for direct impacts. With consideration of the sites distance, SSC will be temporary, localised and expecting to settle within 100m of the survey location, therefore not reaching the SAC.

With regards to The Murrough Wetlands SAC, access through the SAC is not required during the planned surveys, and consequently there is no potential for direct physical disturbance to protected Annex I habitat features. Moreover, the SAC is located behind a gravel bar that maintains a physical separation of the wetlands from the marine environment. As such there is no potential for the qualifying Annex I habitats of this SAC to be affected indirectly, for example through increases in SSC and associated changes in sediment deposition. In addition, all vessels undertaking work will adhere to MARPOL requirements for pollution prevention, which will involve adoption of routine measures and standard best practice in terms of waste management, auditing, storage of chemicals, pollution prevention measures and implementation of a dropped object protocol. This together with strict survey protocols and adherence to standard best practise will prevent a route for impacts due to littering or pollution.

Based on the considerations above, the potential for LSE on the Annex I habitat qualifying feature of the sites has been ruled out and consequently these SACs has been screened out of further assessment.

4.4 Diadromous Fish

4.4.1 Screening Results

The following summarises the designated sites, qualifying interests and impacts that were concluded to likely have a significant effect within the SISAA.

Table 4.6: Diadromous Fish Screened in for Potential LSE

SAC (sites with * are subject to screening updates in Section 4.4.2)	Distance from MULA (km)	QI	Impact
River Boyne and River Blackwater SAC [IE002299]*	55.43	Atlantic salmon; and River lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of suspended sediment concentrations (SSC); and Mortality or reduced fitness arising from pollution or littering events.
Slaney River Valley SAC [IE000781]*	76.73	Atlantic salmon; Sea lamprey; River lamprey; and Freshwater pearl mussel (FWPM).	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Cardigan Bay/ Bae Ceredigion [UK0012712]*	97.98	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Pembrokeshire Marine/ Sir Benfro Forol SAC [UK0013116]*	116.24	Twaite shad; Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Afon Teifi/ River Teifi [UK0012670]*	118.28	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
River Barrow and River Nore SAC [IE002162]*	144.87	Atlantic salmon; FWPM; Sea lamprey; River lamprey; and Twaite shad.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Lower River Suir SAC [IE002137]*	153.74	Atlantic salmon; FWPM; Sea lamprey; River lamprey; and Twaite shad.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.

SAC (sites with * are subject to screening updates in Section 4.4.2)	Distance from MULA (km)	QI	Impact
Dee Estuary/ Aber Dyfrdwy SAC [UK0030131]*	158.78	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Afonydd Cleddau/ Cleddau Rivers SAC [UK0030074]*	184.58	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Carmarthen Bay and Estuaries/ Bae Caerfyddin ac Aberoedd SAC [UK0020020]*	188.71	Twaite shad; Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid SAC [UK0030252]*	189.67	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Blackwater River (Cork/ Waterford) SAC [IE002170]*	200.41	Atlantic salmon; FWPM; Sea lamprey; River lamprey; and Twaite shad.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
River Eden SAC [UK0012643]*	212.97	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
River Derwent and Bassenthwaite Lake SAC [UK0030032]*	219.64	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.

SAC (sites with * are subject to screening updates in Section 4.4.2)	Distance from MULA (km)	QI	Impact
Afon Tywi/ River Tywi SAC [UK0013010]*	226.75	Twaite shad; Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Solway Firth SAC [UK0013025]*	229.67	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Severn Estuary/ Môr Hafren SAC [UK0013030]*	302.99	Twaite shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
River Usk/ Afon Wysg SAC [UK0013007]*	335.79	Twaite shad; Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
River Wye/ Afon Gwy SAC [UK0012642]*	347.40	Twaite shad; Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC [IE000365]*	412.15	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Castlemaine Harbour SAC [IE000343]*	465.08	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.

SAC (sites with * are subject to screening updates in Section 4.4.2)	Distance from MULA (km)	QI	Impact
Cummeen Strand/ Drumcliff Bay (Sligo Bay) SAC [IE000627]*	484.67	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Lough Gill SAC [IE001976]*	501.78	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Killala Bay/ Moy Estuary SAC [IE000458]*	509.17	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
River Moy SAC [IE002298]*	512.36	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Côte de Granit rose-Sept-Iles [FR530009]*	521.7	Twaite shad; Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Lower River Shannon SAC [IE002165]*	538.98	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Tregor Goëlo [FR5300010]*	540.63	Twaite shad; Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.

SAC (sites with * are subject to screening updates in Section 4.4.2)	Distance from MULA (km)	QI	Impact
Rivière Leguer, forêts de Beffou, Coat an Noz et Coat an Hay [FR5300008]*	543.23	Twaite shad; Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Rivière le Douron [FR5300004]*	546.24	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
River Axe SAC [UK0030248]*	561.62	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Rade de Brest, estuaire de l'Aulne [FR5300046]*	562.63	Twaite shad; Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Rivière Elorn [FR5300024]*	567.84	Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Baie de Saint-Brieuc – Est [FR5300066]*	610.68	Twaite shad; and Allis shad.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Lough Corrib SAC [IE000297]*	615.73	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.

SAC (sites with * are subject to screening updates in Section 4.4.2)	Distance from MULA (km)	QI	Impact
Vallée de l'Aulne [FR5300041]*	635.23	Twaite shad; Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Havre de Saint-Germain-sur-Ay et Landes de Lessay [FR2500081]*	647.65	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Estuaire de la Rance [FR5300061]*	648.13	Twaite shad; and Allis shad.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
River Avon SAC [UK0013016]*	653.91	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Littoral Ouest du Cotentin de Bréhal à Pirou [FR2500080]*	656.64	Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Baie du Mont Saint-Michel [FR2500077]*	659.82	Twaite shad; Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Rivière Elle [FR5300006]*	660.63	Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.

SAC (sites with * are subject to screening updates in Section 4.4.2)	Distance from MULA (km)	QI	Impact
Rivière Laïta, Pointe du Talud, étangs du Loc'h et de Lannenec [FR5300059]*	666.84	Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Baie de Seine occidentale [FR2502020]*	673.57	Twaite shad; Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Bassin de l'Airou [FR2500113]*	686.87	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Rivière Scorff, Forêt de Pont Calleck, Rivière Sarre [FR5300026]*	696.72	Twaite shad; Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Vallée de la Sée [FR2500110]*	697.55	Sea lamprey	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Ria d'Etel [FR5300028]*	705.98	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Marais du Cotentin et du Bessin - Baie des Veys [FR2500088]*	715.53	Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.

SAC (sites with * are subject to screening updates in Section 4.4.2)	Distance from MULA (km)	QI	Impact
Golfe du Morbihan, côte ouest de Rhuys [FR5300029]*	724.11	Twaite shad; and Allis shad.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Baie de Seine orientale [FR2502021]*	744.78	Twaite shad; Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Estuaire de la Vilaine [FR5300034]*	756.68	Twaite shad; Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Littoral Cauchois [FR2300139]*	764.92	Twaite shad;	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Estuaire de la Seine [FR2300121]*	777.32	Twaite shad; and Allis shad.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Marais de Vilaine [FR5300002]*	788.52	Twaite shad; and Allis shad.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Marais Vernier, Risle Maritime [FR2300122]*	788.72	Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.

SAC (sites with * are subject to screening updates in Section 4.4.2)	Distance from MULA (km)	QI	Impact
Estuaire de la Loire Nord [FR5202011]*	797.23	Twaite shad; Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Estuaire de la Loire Sud – Baie de Bourgneuf [FR5202012]*	797.86	Twaite shad; Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Estuaire de la Loire [FR5200621]*	802.89	Twaite shad; Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Lac de Grand-Lieu [FR5200625]*	839.68	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Pertuis Charentais [FR5400469]*	845.75	Twaite shad; Allis shad; and Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Vallée de l'Arz [FR5300058]*	864.33	Sea lamprey.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.
Baie de Canche et couloir des trois estuaires [FR3102005]*	875.56	Allis shad.	Injury and disturbance from underwater noise; Disturbance from increased levels of SSC; and Mortality or reduced fitness arising from pollution or littering events.

4.4.2 Updates to Screening After Consultation

After the screening opinion was received from MARA a review of the screening approach was carried out. With consideration of the scale of the proposed activities and MARAs screening opinion, the screening has been updated to align more closely with the approach MARA has taken, such that all Diadromous Fish QIs have been screened out from further assessment.

With regards to consideration of all the designated sites QIs, the SACs are all outside of range of any sediment plumes or underwater noise that will be generated by the proposed activities. With regards to Atlantic salmon and FWPM, tracking data indicate that Atlantic salmon smolts within the south-east coast of Ireland head in a south-westerly direction upon leaving the estuaries (Rikardsen et al., 2021), suggesting that they will not transit through the MULA area during their outward migration. As such there is no pathway for effects from underwater noise or sediment plumes. No information is available on the movement patterns of salmon returning to Irish rivers; however, a similar migration route whereby Atlantic salmon originating from south-east coast rivers migrate along the western and southern coasts of Ireland may be assumed, suggesting that they will not transit through the MULA area during their inward migration too.

With regards to all shad and lamprey QIs, acoustic signals emitted during the planned geophysical surveys produce sound levels within the low to ultrasound frequency range. Data on the effects of these systems on fish receptors are limited; however, studies undertaken to date have shown no evidence of mortality, or potentially mortal injury, arising from pulsed sound sources in the fish species examined (Popper et al., 2014). There is evidence that low to mid frequency acoustic signals, such as those used by some sub-bottom profiling and UHRS systems, may induce TTS in hearing specialists such as twaite shad, given the species' wide hearing bandwidth (Popper et al., 2014). Fish showing TTS following the exposure to seismic sources recovered to full hearing ability within 18-24 hours (Popper et al., 2014), and as such any potential TTS in twaite shad during the planned surveys is expected to be temporary. Similarly, TTS in fish as a result of continuous vessel noise has been shown to be temporary, with full recovery in studied species taking up to fourteen days following noise exposure (Popper et al., 2014). Observations of behavioural responses of fish to sounds emitted during geophysical surveys and vessel operations are also sparse but so far have included avoidance reactions, alteration of schooling behaviour and changes in swimming speed and direction (Popper et al., 2014). However, like TTS, any behavioural responses would be temporary, with affected individuals anticipated to resume normal behaviours or recolonise areas shortly after survey work has ceased. Moreover, given their migratory nature, sea lamprey, river lamprey and twaite shad are anticipated to be transient within the marine area and are therefore not expected to be exposed to the underwater sounds during the planned surveys for extended periods of time. Similarly, as mobile species, all receptors are expected to avoid unfavourable sediment plumes that may be created by the proposed survey work. Moreover, sea lamprey, river lamprey and twaite shad are considered to have some tolerance to increased SSC given their migratory movements through turbid estuarine and coastal environments. Therefore, the low levels and limited extents of the increases in SSC that could be produced by the planned survey work are deemed insufficient to lead to any significant effects on sea lamprey, river lamprey and twaite shad. With consideration of the distance between the MULA and all the considered SACs, any sediment plumes or underwater noise generated during the proposed survey activities will not present a barrier for individuals to access or leave the SAC. With consideration that all vessels undertaking work will adhere to MARPOL requirements for pollution prevention, which will involve adoption of routine measures and standard best practice in terms of waste management, auditing, storage of chemicals, pollution prevention measures and implementation of a dropped object protocol. This together with strict survey protocols and adherence to standard best practise will prevent a route for impacts due to littering or pollution.

Overall, with consideration of the significant distance from the SACs to the MULA area, in addition to the nature of the proposed activities and their associated effects considered above, it is concluded that there are no pathways for effects on any Diadromous Fish QIs and the receptor group is therefore screened out from further assessment.

5 STAGE 2 APPROPRIATE ASSESSMENT ALONE

5.1 Marine Ornithology

5.1.1 South Dublin Bay and River Tolka Estuary SPA

The Licence area overlaps with the intertidal and marine sections of the designated SPA. Details on the site-specific COs are presented in Table 9.1 for all QIs of the designated site.

It is noted that there are no COs for Grey Plover designated for the South Dublin Bay and River Tolka Estuary SPA. This is on the basis that there is an active proposal for the removal of this SCI from the designated sites features. However, as the SCI has not yet been removed, the impacts have been assessed against the same COs as other wader SCIs of this site as a proxy in the interim period, and on a precautionary basis.

5.1.1.1 Waterbirds

The following assessment considers the following waterbird species:

- Light-bellied Brent goose – non-breeding
- Sanderling – non-breeding
- Dunlin – non-breeding
- Knot – non-breeding
- Ringed plover – non-breeding
- Oystercatcher – non-breeding
- Bar-tailed godwit – non-breeding
- Grey plover – non-breeding
- Redshank – non-breeding

Above-water noise, underwater noise and visual impacts

Of the non-breeding waterbird QIs of this SPA, desk-based review of disturbance behaviours (Cutts *et al.*, 2013), indicate that the receptor most sensitive to disturbance and displacement effects in relation to visual and noise impacts during the wintering period (October to March, inclusive) is brent goose.

Brent geese are considered to have the potential to be extremely sensitive to particular types of disturbance arising from visual impacts (including fast movements and the presence of surveyors outside of vehicles), with consideration of disturbance and displacement effects advised for activities within 400 m. Brent geese are also considered to have the potential to be highly sensitive to disturbance arising from above-water noise impacts, with loud (120-125 dB at source) activities potentially resulting in disturbance at a distance of 300 m.

Despite this apparent sensitivity, brent geese have habituated readily to anthropogenic activity within highly industrialised areas around Dublin City. This includes the use of quaysides and mooring areas within Dublin Port, where levels of above-water noise and visual impact are high (Dublin Bay Birds, 2015).

As there is overlap between the SPA and the Licence Area, there is the potential that above-water noise, underwater noise and visual impacts from Proposed Activities may result in adverse impacts to QIs within South Dublin Bay and River Tolka Estuary SPA.

Much of this SPA is in close proximity to high amenity areas (Dublin City and Dublin Port) and, consequently, species may be accustomed to some level of above-water noise, underwater noise and visual disturbance.

For all these QIs, as the nature of the surveys proposed are highly localised, temporary and short in duration, the level of visual disturbance, above-water noise and underwater noise expected from survey activities is not considered to be significantly greater than existing levels.

Mitigation

No survey activities of any kind shall be undertaken within the SPA during the period of October to March, inclusive. The area covered by these restrictions is shown in blue in Figure 8.

As a consequence of this restriction, vessel-based activities around the SPA during the October to March period will be limited to occurring in outshore waters (to the east of the SPA boundary within South Dublin Bay), the River Liffey channel and port areas (in Dublin Port). Activities within outshore waters will be beyond 300 m (maximal potential ranges at which waterbird QIs experience potential above-water noise, underwater noise and visual impacts, from Cutts *et al*., 2013) from the MLWS datum and the intertidal habitats within the SPA, and hence outside areas used by wintering waterbird QIs or where wintering waterbirds QIs may experience disturbance effects from any above-water noise, underwater noise or visual impacts.

Although activities within some parts of Dublin Port may be within 300 m of intertidal habitats within the SPA (for example surveys within the River Liffey channel), the activities would be separated from those habitats in South Dublin Bay by the industrial lands of the Poolbeg peninsula, and the Great South Wall. These intervening lands and structures are considered to remove the potential for disturbance and displacement effects from the Proposed Activities upon wintering waterbird QIs within the South Dublin Bay area of the SPA.

Proposed Activities within the River Liffey channel may be within 300 m of LAT within the River Tolka Estuary part of the SPA (i.e. the SPA area north of the River Liffey). Within this area, where Proposed Activities are to occur within intertidal habitats used by wintering waterbird QIs, those habitats lie within 300 m of the shipping channels to and from Dublin Port. As such QIs present within those habitats are considered to have low sensitivity to anthropogenic disturbance or are habituated to high levels of anthropogenic disturbance associated with the Dublin Port shipping channel.

Black-headed gull and pale-bellied brent geese QIs may use areas of Dublin Port outside but adjacent to the SPA and within 300 m of locations at which Proposed Activities may be undertaken during the October to March period. However, these SCIs will only be in those locations if they already have low sensitivity to anthropogenic disturbance (black-headed gull) or are habituated to high levels of anthropogenic disturbance within Dublin Port (pale-bellied brent goose).

Restricting survey activities within the SPA during the period of October to March will minimise potential disturbance of waterbird QIs from above-water noise, underwater noise and visual impacts during the wintering period. With this mitigation measure, potential adverse impacts to any COs for wintering waterbird QIs are considered negligible. Therefore, it is concluded that there will be no adverse effects upon site integrity as a result of the Proposed Activities alone.

The non-inclusion of September in mitigation in the updated MULA is based on the availability of additional site-specific information from adapted I-WeBS surveys undertaken by the applicant since late 2019. Data from these surveys documents monthly variation in the use of South Dublin Bay by wintering waterbird QIs. Relative abundance of wintering waterbird QIs is relatively low in September and high during the October to March period, inclusive.

Importantly, the restrictions outlined above in relation to wintering waterbirds QIs are considered equally effective. Activities with the potential to impact QIs remain restricted to occurring outside areas and times where above-water noise, underwater noise and visual impacts may result in non-negligible disturbance or displacement effects to wintering waterbird QIs.

Conclusions

Overall, it is concluded above-water noise, underwater noise and visual impacts, with the implementation of mitigation measures, will have a negligible effect on the QIs. It is therefore concluded that there is no potential for AESI on South Dublin Bay and River Tolka Estuary SPA and its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.1.2 Terns

The following assessment considers the following tern species:

- Arctic tern – breeding and non-breeding
- Common tern – breeding and non-breeding
- Roseate tern – non-breeding

Above-water noise, underwater noise and visual impacts for non-breeding species

Staging terns from South Dublin Bay and River Tolka Estuary SPA may experience disturbance or displacement in relation to above-water noise and visual impacts from Proposed Activities either within the SPA during crepuscular periods and at night when roosting, or diurnally ex-situ when foraging, commuting through or carrying out other behaviours within the Licence Area.

For ex-situ diurnal impacts, there is no potential for adverse effects upon the COs of this SCI or the following reasons:

- The spatial footprints of individual survey activities within the Licence Area at any given time will occupy only a minimal proportion of the overall Licence Area. Within the large majority of the Licence Area, any above-water noise, underwater noise and visual impacts generated by survey activities would not be detectable.
- Any surveys which may result in novel forms of above-water noise, underwater noise or visual stimuli (such as borehole drilling during geotechnical surveys) will occur within only brief windows during the Application period. Furthermore, the duration of these surveys at particular locations within the Licence Area would be short (at most, for geotechnical borehole drilling, several days).

Within the SPA, post-breeding assemblages of staging tern congregate around dusk and roost until dawn within intertidal areas to the south of the Great South Wall within the South Dublin Bay part of the SPA. In particular, the exposed sand banks in South Dublin Bay between the Martello Towers at Sandymount (319524, 232021) and Williamstown (320796, 229979) form the main roosting site (Merne *et al*., 2008). There may also be peripheral roosting areas also occurring on adjacent sandflats extending to Irishtown/Great South Wall (to the north) and to Blackrock (to the south), but these birds eventually join the birds roosting in the main area (Merne *et al*., 2008). These areas are identified in the SPA's COs relating to the maintenance of the distribution of roosting tern SCIs (ConservationObjectives.rdl (npws.ie)). However, more recent studies (BirdWatch Ireland, 2016) do not identify these as areas used by roosting/post-breeding tern.

As vessel-based surveys are constrained to being undertaken within water depths exceeding several meters (due to the bathymetric profile of South Dublin Bay where shallow intertidal gradients mean water depths remain low for large distances from shoreline), boat-based surveys will not be conducted within 200 m from any tern SCIs occupying intertidal roosting sites. Recent work suggests a minimum buffer of 100 m around staging tern congregations to minimise disturbance responses (Althouse *et al*., 2019), however more conservative estimates from other studies suggest minimum separation distances between activities of 140 m (Rogers & Schwikert, 2002) and 200 m (Erwin, 1989) to minimise disturbance effects. As such vessel-based surveys shall not be undertaken within distances at which disturbance or displacement effects may occur in relation to above-water noise or visual impacts.

Surveys to be undertaken within intertidal habitats will include cone penetration geotechnical surveys and intertidal archaeological metal detection surveys. Both surveys will be undertaken within a corridor to the north of the main roosting site within South Dublin Bay. Although this corridor lies over 200 m from the main tern roosting site, it may pass through, or close to, peripheral roosting areas south of South Bull Wall. As such roosting tern QIs may experience disturbance or displacement effects as a consequence of above-water noise or visual impacts of these works should they be undertaken during crepuscular or nocturnal periods. Furthermore, additional benthic habitat surveys shall be undertaken across intertidal areas across South Dublin Bay. Should these surveys be undertaken during crepuscular or nocturnal periods, they too may result in disturbance or displacement through above-water noise or visual impacts, particularly within and around the main roosting site.

Above-water noise, underwater noise and visual impacts for breeding species

There are several pontoons/structures in the Dublin Port area where tern breed and are actively monitored. One such pontoon (ESB Dolphin) falls into the catchment of the SPA. However, it is considered that four main tern pontoons are used by the SPA populations, namely:

- CDL (coal distribution LTD) dolphin;
- ESB (Electricity supply board) dolphin;
- Pontoon No. 1 located North of Dublin port in the Tolka Estuary; and
- Pontoon No 2. located by the great south wall.

Breeding tern from South Dublin Bay and River Tolka Estuary SPA may experience disturbance or displacement in relation to above-water noise and visual impacts from Proposed Activities either within the SPA when in attendance at breeding colonies, or ex-situ when foraging, commuting through or carrying out other behaviours within the Licence Area.

Breeding tern can be disturbed or displaced by above-water noise, underwater noise and/or visual impacts, although information to allow attribution of causation to one or the other is currently lacking. Their response to these impacts can vary based on the stimuli, the distance, the species and the flock size (Furness *et al*., 2012, Althouse *et al*., 2019).

Disturbance responses of tern within breeding colonies have been observed to be very limited in response to vessel-based anthropogenic activities where colonies occur in highly disturbed environments. For example, common tern breeding in Cork Harbour show no disturbance response to very large vessels docking within 50 m (RPS, 2018). More conservative estimates from other studies, however, suggest minimum separation distances between activities of 140 m (Rogers & Schwikert, 2002) and 200 m (Erwin, 1989) to minimise disturbance effects.

Foraging Arctic and common tern are considered to be of low or low/moderate sensitivity to disturbance from vessel traffic (Garthe & Hüppop, 2004; Bradbury *et al*., 2014; Furness *et al*., 2012, Fleissbach *et al*., 2019), Indeed, common tern are known to forage where vessel traffic levels are already high (Wilson *et al*., 2014). Furthermore, as South Dublin Bay and River Tolka Estuary SPA lies close to Dublin Port these QIs are likely to be accustomed to a moderate to high levels of above-water noise and visual disturbance associated with vessel traffic.

In an assessment of seabird sensitivities to adverse impacts from underwater tidal energy devices, Furness *et al*. (2012) scored common, Arctic and Roseate tern as ‘1’ (the minimum score) in relation to their mean and maximum diving depths, citing mean diving depths of 0 m and maximum diving depths of 1 m (Haney & Stone, 1988).

This is consistent with a review of seabird foraging ecology undertaken by RPS on behalf of the Welsh Assembly (2011), which states:

> ‘There are no specific data available for common tern, but all terns plunge dive to a maximum depth of approximately 1 m (Steve Votier pers. comm.).’,

'Immersion during dives is normally just complete, i.e. less than 20 cm, but will be only partial if prey visibility is restricted to the surface (Snow & Perrins, 1998).'; and,

'Like other tern species, roseate terns are plunge-divers. The depths they can dive tend to exceed those of other small terns as they initiate the dive from a greater altitude and fly into the water without hovering (Kirkham & Nisbet, 1987). There are no specific data available for roseate tern, but all terns plunge dive to a maximum depth of approximately 1 m (Steve Votier pers. comm.).'

As such, for any foraging behaviours in which these tern QIs may be submerged within the water column, submersion durations are very brief (at most several seconds). These QIs do not actively forage within the water column in such a way that underwater noise impacts might affect their foraging behaviour.

Furthermore, based on what is known about the physiology of hearing in birds they do not hear well underwater and, therefore, are unlikely to be impacted when diving. Anatomical studies of ear structure in diving birds, such as Dooling and Therrien (2012), suggests that there are adaptations for protection against the large pressure changes that may occur while diving, which may protect the ear from damage due to acoustic over-exposure. In addition, unlike marine mammals, birds have the ability to stay above the water and escape the area by flying, therefore avoiding potential damage.

Mitigation

During the period from mid-July to September (inclusive) the following restrictions to works during crepuscular and nocturnal periods shall be implemented:

For intertidal benthic habitat surveys within the SPA, should works be undertaken during mid-July to September, activities will be avoided during the hours in which roosting tern may be present. This would be between one hour before the end of civil dusk and one hour after the start of civil dawn [Approximately between 21:05 and 05:40 in mid-July and 18:40 and 07:50 in late September].

For intertidal geotechnical and archaeology surveys, should works be undertaken during mid-July to September, activities will be avoided during the hours in which roosting tern may be present. This would be between one hour before the end of civil dusk and one hour after the start of civil dawn [Approximately between 21:05 and 05:40 in mid-July and 18:40 and 07:50 in late September]. These works may, however, continue into crepuscular and nocturnal periods on the condition that an Ecological Clerk of Works (ECoW) determines that no potentially roosting tern are present within 200 m of any areas in which those activities are to be undertaken during any particular nocturnal or crepuscular period. This would include within 200 m of ingress and egress routes to work areas. Should potentially roosting tern be present within a 200 m vicinity, no works would be undertaken within that area after one hour before the end of civil dusk until one hour after the start of civil dawn.

The area covered by these restrictions is shown in blue in Figure 8 and Figure 9.

No restrictions are proposed to vessel-based activities, as these will not occur within such distances of the shoreline to result in potential disturbance or displacement effects to roosting tern QIs (i.e. shallow water depths around intertidal areas used by roosting tern QIs prevent vessel-based activities being undertaken within 200 m of those areas when they would be occupied by tern).

Restricting survey activities within the area of the SPA shown in Figure 9 (Appendix B – Figures) during the period of mid-July to September will minimise potential disturbance of roosting tern QIs from above-water noise and visual impacts during the post-breeding period. With this mitigation measure, potential adverse impacts to any COs for post-breeding tern QIs are considered negligible. Therefore, it is concluded that there will be no adverse effects upon site integrity as a result of the Proposed Activities alone.

Note - In the existing FIL (CWP, 2020) a restriction on works within 100 m of the SPA boundary outside the times of 0900 to 1700 between mid-July to September (inclusive), was identified to mitigate impacts to post-breeding tern QIs.

Importantly, the restrictions outlined above in relation to post-breeding tern QIs are considered equally effective. Activities with the potential to impact SCIs remain restricted to occurring outside areas and times where above-water noise and visual impacts may result in non-negligible disturbance or displacement effects to post-breeding tern QIs.

For all vessel-based survey activities which will (or may) occur within and around Dublin Port the following mitigation measure is identified:

- No works will be undertaken north of the Great South Wall, within Dublin Port, the channel of the River Liffey or the Tolka Estuary part of the SPA, during the period of mid-April to mid-August, inclusive.

This restriction will minimise the potential for disturbance of breeding tern QIs from above-water noise and visual impacts during the breeding period. With this mitigation measure, potential adverse impacts to any COs for breeding tern QIs are considered negligible. Therefore, it is concluded that there will be no adverse effects upon site integrity as a result of the Proposed Activities alone.

Note - In the existing FIL (CWP, 2020) restrictions to mitigate impacts to breeding tern QIs were within 200 m of pontoons in Dublin Port and the Tolka Estuary on which breeding tern colonies occur.

It is recognised that the updated restriction outlined above is highly precautionary, however it enables greater ease of management for the Proposed Activities. Importantly, activities with the potential to impact SCIs remain restricted to occurring outside areas and times where above-water noise and visual impacts may result in non-negligible disturbance or displacement effects to breeding tern QIs.

Conclusions

Overall, it is concluded above-water noise, underwater noise and visual impacts, with the implementation of mitigation measures, will have a negligible effect on the QIs. It is therefore concluded that there is no potential for on South Dublin Bay and River Tolka Estuary SPA and its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.1.3 Black-headed gull - non-breeding

Above-water noise, underwater noise and visual impacts

Wintering black-headed gull from this SPA may forage within the wider Licence Area in offshore areas. In doing so this QI may thereby experience potential ex-situ impacts in association with Proposed Activities.

However, black-headed gull show low sensitivities to vessel disturbance (Fleissbach *et al*., 2019). Furthermore, this SPA lies adjacent to Dublin Port, an active port with regular vessel traffic. As such, the species present are likely to be accustomed to moderate to high levels of above-water noise, underwater noise and visual disturbance associated with anthropogenic activities.

Additionally, in an assessment of seabird sensitivities to adverse impacts from underwater tidal energy devices, Furness *et al*. (2012) scored black headed gull as '1' (the minimum score) in relation to their mean and maximum diving depths, citing mean diving depths of 0 m and maximum diving depths of 1 m (Cramp & Simmons, 1980).

This is consistent with a review of seabird foraging ecology undertaken by RPS on behalf of the Welsh Assembly (2011), which states:

'[Black-headed gull] has a wide variety of feeding strategies, one of which is surface-plunges to take floating food, occasionally fully submerging. This is usually from c. 2 m high, often after hovering, and with wings drawn into body (Snow & Perrins, 1998)'

As such, for any foraging behaviours in which black-headed gull may be submerged within the water column, submersion durations are very brief (at most several seconds). This QI does not actively forage within the water column in such a way that underwater noise impacts might affect its foraging behaviour.

Furthermore, based on what is known about the physiology of hearing in birds they do not hear well underwater and, therefore, are unlikely to be impacted when diving. Anatomical studies of ear structure in diving birds, such as Dooling and Therrien (2012), suggests that there are adaptations for protection against the large pressure changes that may occur while diving, which may protect the ear from damage due to acoustic over-exposure. In addition, unlike marine mammals, birds have the ability to stay above the water and escape the area by flying, therefore avoiding potential damage.

Mitigation

The mitigation discussed for waterbird species in Section 5.1.1.1 is applicable to this species.

Conclusions

Overall, it is concluded above-water noise, underwater noise and visual impacts, with the implementation of mitigation measures, will have a negligible effect on the QIs. It is therefore concluded that there is no potential for on South Dublin Bay and River Tolka Estuary SPA and its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.1.4 Waterbirds and Wetlands

Habitat disturbance

The Proposed Activities may indirectly impact the supporting habitats for the QIs screened in above in Table 4.1 through the direct disturbance of their supporting habitats and those of their prey species.

Wading birds typically forage on exposed tidal flats. However, some species, namely lapwing and golden plover, are terrestrial waders that primarily feed on grasslands and use tidal flats mainly for roosting (NPWS, 2014). During high tide, when tidal flats are submerged, many intertidal foragers move to nearby fields to continue feeding (NPWS, 2014). Cold temperatures can further reduce the profitability of intertidal foraging, increasing the importance of terrestrial habitats (Zwarts & Wanink, 1993).

Furthermore, species like black-tailed godwit are generalists that utilise both intertidal and terrestrial areas for foraging (NPWS, 2014). Similarly, light-bellied brent geese can switch between habitats when intertidal food sources such as seagrass and algae become depleted, turning instead to grasslands (NPWS, 2014). Herbivorous birds, including Bewick's Swan, rely upon terrestrial habitats often outside of the SPA boundary, for feeding and use wetlands mainly for roosting (NPWS, 2014).

As outlined above, several waterbird species utilise the intertidal mud and sand flats in the South Dublin Bay and River Tolka Estuary SPA with varying degrees of habitat reliance. For example, light-bellied brent goose has a moderate ability (score 2) to utilise alternative habitats (NPWS, 2014) and has been noted to be habituated to high-levels of disturbance within Dublin Port. Similarly, the oystercatcher and black-headed gull also scored 2, indicating some flexibility in habitat use, particularly during high tide. It should be noted, black-headed gull are considered to have a low sensitivity to anthropogenic disturbance. In contrast, species such as sanderling, dunlin, knot, ringed plover, bar-tailed godwit, grey plover, and redshank scored 3, reflecting a high dependency on wetland habitats due to limited suitable alternatives in the surrounding environment (NPWS, 2014).

Tern species primarily roost on exposed sandbanks in South Dublin Bay, between the Martello Towers at Sandymount and Williamstown (Merne *et al*., 2008; NPWS, 2015). Some individuals are seen on nearby

sandflats (Irishtown/South Bull Wall and Blackrock) but eventually join the main roost. Terns are likely feed during the day across the wider Dublin Bay, with most birds arriving at the roost from the east and southeast, which suggests they are feeding in shallow waters around Kish/Bray and Burford Banks.

The Proposed Activities do not directly overlap with the wetlands habitat.

Conclusion

Based on the temporary nature of habitat disturbance from the Proposed Activities, alongside the proposed mitigation measures detailed in section 5.3.3 (reducing the temporal overlap), it is concluded that there is no potential for AESI from habitat disturbance on South Dublin Bay and River Tolka Estuary SPA or its COs as a result of the Proposed Activities. All impacts have negligible potential for AESI, and they are therefore screened out from the in-combination assessment.

Litter and pollution

Littering or pollution events arising from Proposed Activities may directly impact on the fitness or health of all QIs screened in above in Table 4.1, their prey species or supporting habitats.

Mitigation

In order to ensure no adverse effects on QIs, all vessels undertaking survey works will adhere to MARPOL requirements, which provide an international standard for the safe management and operation of ships for pollution prevention.

This will involve adoption of routine measures and standard best practice in terms of waste management, auditing, pollution prevention measures and implementation of a dropped object protocol. Oil and fuel shall be stored securely in bunded containers. Chemicals will be stored securely, and good housekeeping practices will be adhered to always.

Through implementation of these mitigation measures there will be no route to impact for litter and pollution impacts to QIs. Therefore, it is possible to conclude no adverse effect on site integrity from the Proposed Activities alone.

Conclusion

Overall, with consideration of the mitigation being implemented and followed as is required, there is no potential for on South Dublin Bay and River Tolka Estuary SPA and its COs as a result of litter and pollution. As there will be no effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.2 The Murrough SPA

5.1.2.1 Waterbirds

The following assessment is for the following species:

- Teal – non-breeding
- Wigeon – non-breeding
- Greylag goose – non-breeding

- Light-bellied Brent goose – non-breeding

Above-water noise, underwater noise and visual impacts

Of the wintering waterbird QIs of The Murrough SPA, desk-based review of disturbance behaviours (Cutts *et al*., 2013; Pease *et al*., 2005; Holloway, 1997), indicate that the receptor most sensitive to disturbance and displacement effects in relation to visual, above-water noise and underwater noise impacts during the wintering period (October to March, inclusive) is brent goose.

Brent geese are considered extremely sensitive to particular types of disturbance arising from visual impacts (including fast movements and the presence of surveyors outside of vehicles), with consideration of disturbance and displacement effects advised for activities within 400 m. Brent geese are also considered highly sensitive to disturbance arising from above-water noise impacts, with loud (120-125 dB at source) activities potentially resulting in disturbance at a distance of 300 m.

Much of the southern part of this SPA is in close proximity to a high amenity area (Wicklow) and, consequently, species may be accustomed to some level of above-water noise and visual disturbance. Furthermore, although the survey area is adjacent to the designated site, it is approximately 1 km away from the end of the urban environment. The only parts of the SPA within range of disturbance from the Proposed Activities lie adjacent to Wicklow Harbour, an active port with regular vessel traffic. As such, the species present are considered to be accustomed to a moderate to high levels of above-water noise and visual disturbance associated with anthropogenic activities. With this in consideration it is concluded that disturbance from the Proposed Activities will have a negligible effect.

Conclusions

Overall, it is concluded above-water noise, underwater noise and visual impacts will have a negligible effect on the QIs. It is therefore concluded that there is no potential for AESI on The Murrough SPA and its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.2.2 Gull Species

The following assessment is for the following species:

- Herring gull – non-breeding
- Black-headed gull – non-breeding

Above-water noise, underwater noise and visual impact

Wintering black-headed gull and herring gull from The Murrough SPA may forage within the Licence Area in offshore areas. In doing so these QIs may thereby experience potential ex-situ impacts in association with Proposed Activities.

However, black-headed gull and herring gull show comparatively low sensitivities to vessel disturbance (Fleissbach *et al*., 2019). Furthermore, the only parts of the SPA within range of disturbance from the Proposed Activities lie adjacent to Wicklow Harbour, an active port with regular vessel traffic. As such, the species present are considered to be accustomed to a moderate to high levels of above-water noise, underwater noise and visual disturbance associated with anthropogenic activities. With this in consideration it is concluded that disturbance from the Proposed Activities will have a negligible effect.

Additionally, in an assessment of seabird sensitivities to adverse impacts from underwater tidal energy devices, Furness *et al*. (2012) scored black-headed and herring gulls as '1' (the minimum score) in relation to their mean and maximum diving depths, citing mean diving depths of 0 m and maximum diving depths of 1 m (Cramp & Simmons, 1980).

This is consistent with a review of seabird foraging ecology undertaken by RPS on behalf of the Welsh Assembly (2011), which states:

'The herring gull uses various methods of feeding: (i) dipping-to-surface to take items on or just below surface; (ii) surface-plunging, from 5–6 m; (iii) surface-seizing, on occasion immersing head and front part of body; and (iv) shallow surface-diving (Snow & Perrins, 1998).'

And '[black-headed gull] has a wide variety of feeding strategies, one of which is surface-plunges to take floating food, occasionally fully submerging. This is usually from c. 2 m high, often after hovering, and with wings drawn into body (Snow & Perrins, 1998)'

As such, for any foraging behaviours in which herring and black-headed gulls may be submerged within the water column, submersion durations are very brief (at most several seconds). These QIs do not actively forage within the water column in such a way that underwater noise impacts might affect their foraging behaviour.

Furthermore, based on what is known about the physiology of hearing in birds they do not hear well underwater and, therefore, are unlikely to be impacted when diving. Anatomical studies of ear structure in diving birds, such as Dooling and Therrien (2012), suggests that there are adaptations for protection against the large pressure changes that may occur while diving, which may protect the ear from damage due to acoustic over-exposure. In addition, unlike marine mammals, birds have the ability to stay above the water and escape the area by flying, therefore avoiding potential damage.

Considering all of the above, it is concluded that there is negligible potential for underwater noise to result in an AESI of the site.

Conclusion

Overall, it is concluded above-water noise, underwater noise and visual impacts will have a negligible effect on the QIs. It is therefore concluded that there is no potential for AESI on The Murrough SPA and its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.2.3 Red-throated diver - non-breeding

Above-water noise, underwater noise and visual impacts

Wintering red-throated diver are considered extremely sensitive to disturbance and displacement in relation to vessel movements (although the extent to which these effects are resultant from visual, above-water noise or underwater noise impacts is unclear). Schwemmer *et al*., 2011, demonstrated avoidance of areas with high levels of vessel activity, with very high proportions of individuals demonstrating flight responses to approaching vessels at ranges of 1 km or less (Bellebaum *et al*., 2006; Topping & Petersen, 2011). Although evidence of disturbance responses in relation to vessel activity beyond this distance is lacking, red throated divers have been observed to exhibit displacement effects in relation to fixed infrastructure such as offshore wind turbines at varied spatial scales depending on the location, (displacement effects detectable in excess of 10 km – i.e. Viela *et al*., 2020, and 1 km for vessels (Goodship and Furness, 2022, through reference to Laursen *et al* 2017)).

Consequently, red throated divers may experience temporary displacement through disturbance arising in association with vessel-based Proposed Activities in the vicinity of The Murrough SPA.

Despite this, the potential for such effects resulting in significant adverse effects upon the COs of this QI is considered very unlikely for the following reasons:

- Additional above-water noise and visual disturbance associated with the Proposed Activities will represent a very small addition to baseline levels associated with existing moderate to high vessel traffic in relation to Wicklow Port.
- All of the Proposed Activities within range to disturb red-throated divers within The Murrough SPA lie within or in very close proximity to Wicklow Port, an active port and inshore from a major north-south shipping lane from Dublin Port. Therefore, it is expected that birds present may be accustomed to moderate to high levels of underwater noise, above-water noise and visual impacts associated with anthropogenic activities.
- The spatial footprints of individual survey activities within the Licence area at any given time will occupy only a minimal proportion of the overall Licence area, and with consideration of the 2 km deterrence range a significantly small portion of the SPA. With the majority of activities within the Licence area, any underwater noise, above-water noise or visual impacts generated by survey activities would not be detectable from the SPA.
- Any surveys which may result in novel forms of underwater noise stimuli (such as geophysical surveys or borehole drilling during geotechnical surveys) will occur within only brief windows during the Application period. Furthermore, the duration of these surveys at particular locations within the Licence area would be short (at most, for geotechnical borehole drilling, several days)
- Furthermore, based on what is known about the physiology of hearing in birds they do not hear well underwater and, therefore, are unlikely to be impacted when diving. Anatomical studies of ear structure in diving birds, such as Dooling and Therrien (2012), suggests that there are adaptations for protection against the large pressure changes that may occur while diving, which may protect the ear from damage due to acoustic over-exposure. In addition, unlike marine mammals, birds have the ability to stay above the water and escape the area by flying, therefore avoiding potential damage.

Conclusion

With consideration of all of the impacts above, and mitigating factors such as biology, baseline anthropogenic disturbance and the short-term and temporary nature of the Proposed Activities, it is therefore concluded that there will be negligible effect and therefore no potential for AESI on The Murrough SPA and its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.2.4 Little tern - breeding

Above-water noise, underwater noise and visual impacts

Breeding little tern may be highly susceptible to disturbance at their breeding colonies, although the extent to which these effects are resultant from visual or above-water/underwater noise impacts is unclear. Disturbance at the site of breeding colonies is a well-documented cause of lowered breeding productivity, particularly as little tern favour shingle beaches, often in proximity to human habitations (Cabot & Nisbet, 2013, Parsons *et al*., 2015).

As a consequence, many little tern colonies are now subject to monitoring by dedicated conservationists during the breeding season. In the Murrough SPA, the Kilcoole Little Tern Conservation Project (http://littleternconservation.blogspot.com/) undertakes this task. Breeding little tern are found in general between the Kilcoole station and Newcastle train station areas, a distance of 2 km from the nearest Proposed Activities to the south and 2 km from the nearest Proposed Activities to the north.

As no works are proposed within approximately 2 km of the breeding colony, there is considered to be no potential for disturbance from Proposed Activities at the little tern breeding colony at Kilcoole.

However, the mean maximum foraging range of little tern is 5.0 km (Woodward *et al*., 2019), therefore, birds from this colony may forage within surrounding parts of the Licence Area. Foraging little tern are considered to be of moderate sensitivity to disturbance from some forms of vessel traffic (Garthe & Hüppop, 2004; Bradbury *et al*., 2014). Despite this, given the nature of the Proposed Activities, they are not considered to significantly increase baseline levels of above-water noise or visual impacts (considering the nearby North-South shipping lanes to Dublin and active Wicklow port) within peripheral foraging areas (2-5 km from the Kilcoole colony).

Additionally, in an assessment of seabird sensitivities to adverse impacts from underwater tidal energy devices, Furness *et al*. (2012) scored little tern as '1' (the minimum score) in relation to their mean and maximum diving depths, citing mean diving depths of 0 m and maximum diving depths of 1 m (Haney & Stone, 1988).

This is consistent with a review of seabird foraging ecology undertaken by RPS on behalf of the Welsh Assembly (2011), which states:

> 'Little terns feed by plunge diving from a hover (Cramp & Simmons, 1985). They usually fish in very shallow water only a few cms deep often over the advancing tideline (Davies, 1981) or in brackish lagoons and saltmarsh creeks (Cramp & Simmons, 1985).'

As such, for any foraging behaviours in which little tern may be submerged within the water column, submersion durations are very brief (at most several seconds). This QI does not actively forage within the water column in such a way that underwater noise impacts might affect its foraging behaviour. There are no potential adverse impacts to any COs identified for this QI as a result of underwater noise impacts. There will be no adverse effects upon site integrity as a result of underwater noise impacts from the Proposed Activities alone.

Furthermore, based on what is known about the physiology of hearing in birds they do not hear well underwater and, therefore, are unlikely to be impacted when diving. Anatomical studies of ear structure in diving birds, such as Dooling and Therrien (2012), suggests that there are adaptations for protection against the large pressure changes that may occur while diving, which may protect the ear from damage due to acoustic over-exposure. In addition, unlike marine mammals, birds have the ability to stay above the water and escape the area by flying, therefore avoiding potential damage.

Overall, with consideration of the availability of other foraging habitat nearby to the Kilcoole colony and outside the Licence Area, there is negligible potential for adverse impacts to any COs for this SCI in relation to above-water noise and visual impacts. There will be no adverse effects upon site integrity as a result of above-water noise and visual impacts from the Proposed Activities alone.

Conclusions

With consideration of all of the impacts above, and mitigating factors such as biology, baseline anthropogenic disturbance and the short-term and temporary nature of the Proposed Activities, it is therefore concluded that there will be negligible effects and no potential for AESI on The Murrough SPA and its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.2.5 All QIs

Litter and pollution

Both the assessment and mitigation for this site is the same as South Dublin Bay and River Tolka Estuary SPA in Section 5.1.1.

Conclusion

Overall, with consideration of the mitigation being implemented and followed as is required, there is no potential for on The Murrough SPA and its COs as a result of litter and pollution. As there will be no effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.3 Dalkey Islands SPA

5.1.3.1 Tern Species

The following assessment considers the following tern species:

- Arctic tern – breeding and non-breeding
- Common tern – breeding and non-breeding
- Roseate tern – breeding and non-breeding

Above-water noise, underwater noise and visual impacts

Staging tern from Dalkey Island SPA may experience disturbance or displacement in relation to above-water noise and visual impacts from Proposed Activities ex-situ when foraging, commuting through or carrying out other behaviours within the Licence Area.

Post-breeding, staging areas are key to building up reserves required for tern migrations. Staging tern can be disturbed or displaced by above-water noise and/or visual impacts, although information to allow attribution of causation to one or the other is lacking. Their response to these impacts can vary based on the stimuli, the distance, the species and the flock size (Furness *et al*., 2012, Althouse *et al*., 2019).

Post-breeding assemblages of staging tern congregate around dusk and roost until dawn. Recent work suggests a minimum buffer of 100 m around staging tern congregations to minimise disturbance responses (Althouse *et al*., 2019), however more conservative estimates from other studies suggest minimum separation distances between activities of 140 m (Rogers & Schwikert, 2002) and 200 m (Erwin, 1989) to minimise disturbance effects. The designated site is located 290 m from Licence area and therefore all activity is well outside of the minimum separation distance.

Foraging Arctic, common and roseate tern are considered to be of low or low/moderate sensitivity to disturbance from of vessel traffic (Garthe & Hüppop, 2004; Bradbury *et al*., 2014; Furness *et al*., 2012, Fleissbach *et al*., 2019), Indeed, common tern are known to forage where vessel traffic levels are already high (Wilson *et al*., 2014). Furthermore, as Dalkey Islands SPA lies close to Dublin Port and Dun Laoghaire Harbour these QIs are likely to be accustomed to a moderate to high levels of above-water noise and visual disturbance associated with vessel traffic.

With consideration that the designated site is further away than the 200 m recommended buffer, it is concluded that there will be negligible impact on tern within the SPA whilst activities are being carried out.

Moreover, in an assessment of seabird sensitivities to adverse impacts from underwater tidal energy devices, Furness *et al*. (2012) scored common, Arctic and roseate tern as '1' (the minimum score) in relation to their mean and maximum diving depths, citing mean diving depths of 0 m and maximum diving depths of 1 m (Haney & Stone, 1988).

This is consistent with a review of seabird foraging ecology undertaken by RPS on behalf of the Welsh Assembly (2011), which states:

> 'There are no specific data available for common tern, but all terns plunge dive to a maximum depth of approximately 1 m (Steve Votier pers. comm.).',

'Immersion during dives is normally just complete, i.e. less than 20 cm, but will be only partial if prey visibility is restricted to the surface (Snow & Perrins, 1998).'; and,

'Like other tern species, roseate terns are plunge-divers. The depths they can dive tend to exceed those of other small terns as they initiate the dive from a greater altitude and fly into the water without hovering (Kirkham & Nisbet, 1987). There are no specific data available for roseate tern, but all terns plunge dive to a maximum depth of approximately 1 m (Steve Votier pers. comm.).'

As such, for any foraging behaviours in which these tern QIs may be submerged within the water column, submersion durations are very brief (at most several seconds). These QIs does not actively forage within the water column in such a way that underwater noise impacts might affect their foraging behaviour.

Furthermore, based on what is known about the physiology of hearing in birds they do not hear well underwater and, therefore, are unlikely to be impacted when diving. Anatomical studies of ear structure in diving birds, such as Dooling and Therrien (2012), suggests that there are adaptations for protection against the large pressure changes that may occur while diving, which may protect the ear from damage due to acoustic over-exposure. In addition, unlike marine mammals, birds have the ability to stay above the water and escape the area by flying, therefore avoiding potential damage.

There are no potential adverse impacts to any COs identified for these QIs as a result of underwater noise impacts. There will be no adverse effects upon site integrity as a result of underwater noise impacts from the Proposed Activities alone.

Conclusion

With consideration of all of the impacts above, and mitigating factors such as biology, baseline anthropogenic disturbance and the short-term and temporary nature of the Proposed Activities, it is therefore concluded that there will be negligible effect and therefore no potential for AESI on The Dalkey Islands SPA and its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

Litter and pollution

Both the assessment and mitigation for this site is the same as South Dublin Bay and River Tolka Estuary SPA in Section 5.1.1.

Conclusions

With consideration of all of the impacts above, and mitigating factors such as biology, baseline anthropogenic disturbance, mitigation implemented and the short-term and temporary nature of the Proposed Activities it is concluded there is negligible potential for effect. It is therefore concluded that there is no potential for AESI on Dalkey Islands SPA and its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.4 North-West Irish Sea SPA

North-West Irish Sea SPA is a unique SPA in that it is solely an important resource for marine birds and not where colonies are located. The estuaries and bays that open into it along with connecting coastal stretches of intertidal and shallow subtidal habitats, provide safe feeding and rooting habitats through winter and migratory

periods. These areas, along with the more pelagic marine waters further offshore, provide additional supporting habitats for seabirds that breed in colonies from other nearby designated sites.

5.1.4.1 Birds Related to Nearby Breeding Colonies within other SPA

The following bird species are considered within other SPAs within this assessment:

- Cormorant (Skerries Island SPA, Ireland's Eye SPA and Lambay Island SPA)
- Herring gull (Skerries Island SPA, Ireland's Eye SPA and Lambay Island SPA)
- Kittiwake (Lambay Island SPA, Ireland's Eye SPA and Howth Head SPA)
- Guillemot (Lambay Island SPA and Ireland's Eye SPA)
- Razorbill (Lambay Island SPA and Ireland's Eye SPA)
- Roseate tern (Rockabill SPA)
- Common tern (Rockabill SPA)
- Arctic tern (Rockabill SPA)
- Puffin (Lambay Island SPA)
- Little tern (Boyne Estuary SPA)
- Shag (Skerries Island SPA and Lambay Island SPA)
- Fulmar (Lambay Island SPA)
- Lesser black-backed gull (Lambay Island SPA)

All of their COs (where they exist) are included in Table 9.1. Where COs have not been set for the QI, the closest designated site to that site with relevant COs has been considered instead.

All impacts

All of the above QIs are designated within North-West Irish SPA in relation to the other SPAs stated with them, with the North-West Irish Sea SPA comprising of foraging and roosting habitat for those breeding and/or wintering colonies. The North-West Irish Sea SPA is located > 500 m from the Licence area and therefore there is negligible risk of disturbance to QIs within the SPA. Of the species above that may be found within the Licence area, they have been assessed within their designated site assessments, primarily Sections 5.1.7 and 5.1.8 for Howth Head SPA and Ireland's Eye SPA respectively. For species where their designated site was screened out within the SISAA, such as Lambay Island SPA and Skerries Island SPA, there is therefore no potential for AESI as there is no pathway for effect, as their source is not the North-West Irish Sea SPA but those designated sites, acknowledging they do use the North-West Irish Sea SPA as a resource.

With regards to litter and pollution both the assessment and mitigation for this site is the same as South Dublin Bay and River Tolka Estuary SPA in Section 5.1.1.

Conclusions

Overall, with consideration that it has been stated above with the relevant linked designated sites assessments that all impacts will have a negligible effect, it is therefore concluded that there is no potential for AESI on the North-West Irish Sea SPA or its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.4.2 Bird QIs with High Numbers not Associated with other SPAs

- Black-headed gull

- Common gull
- Great black-backed gull
- Little Gull
- Manx shearwater
- Common scoter

All of their COs (where they exist) are included in Table 9.1. COs have not been set for the QI, the closest designated site to that site with relevant COs has been considered instead.

All impacts

Black-headed gull, common gull, great black-backed gull, little gull, Manx shearwater and common scoter all have low or very low vulnerability to disturbance associated with above-water noise and/ or visual impacts (Bradbury *et al.*, 2014 and Fliessbach *et al.*, 2019). With consideration of the distance from the Licence area being > 500 m there is negligible potential for impact from above-water noise and visual impacts on these species within the SPA. If there are individuals associated with the SPA located within the Licence area it is considered that should they be subject to disturbance such that they are displaced, they will likely relocate to within the SPA or other suitable habitat nearby as there is ample suitable habitat within range based on ranges provided by Woodward *et al.*, (2019), and there are no barrier effects preventing movement.

With regards to under-water noise, this may be due to the seabirds shallow diving, dip diving or surface feeding which all have limited sensitivity to underwater noise impacts due to the brevity of exposure time and their sensitivity to disturbance as highlighted above. All of the species spend the majority of their time above or on the water surface. Furthermore, based on what is known about the physiology of hearing in birds they do not hear well underwater and, therefore, are unlikely to be impacted when diving. Anatomical studies of ear structure in diving birds, such as Dooling and Therrien (2012), suggests that there are adaptations for protection against the large pressure changes that may occur while diving, which may protect the ear from damage due to acoustic over-exposure. Furthermore, unlike marine mammals, birds have the ability to stay above the water and escape the area by flying, therefore avoiding potential damage.

It is considered that there is no potential for AESI expected for any of the bird species due these activities.

With regards to litter and pollution both the assessment and mitigation for this site is the same as South Dublin Bay and River Tolka Estuary SPA in Section 5.1.1.

Conclusions

Overall, with consideration that it has been stated above that all impacts, with the implementation of mitigation measures where needed, will have a negligible effect, it is therefore concluded that there is no potential for AESI on the North-West Irish Sea SPA or its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.4.3 Divers

The following species are considered within the below assessment;

- Red-throated diver
- Great Northern diver

All of their COs (where they exist) are included in Table 9.1. Where COs have not been set for the QI, the closest designated site to that site with relevant COs has been considered instead.

All impacts

Wintering red-throated diver and Great Northern diver are considered extremely sensitive to disturbance and displacement in relation to vessel movements (although the extent to which these effects are resultant from visual, above-water noise or underwater noise impacts is unclear). Schwemmer *et al*., 2011, demonstrated avoidance of areas with high levels of vessel activity, with very high proportions of individuals demonstrating flight responses to approaching vessels at ranges of 1 km or less (Bellebaum *et al*., 2006; Topping & Petersen, 2011). Although evidence of disturbance responses in relation to vessel activity beyond this distance is lacking, red throated diver have been observed to exhibit displacement effects in relation to offshore wind turbines at considerably large spatial scales (displacement effects detectable in excess of 10 km – i.e. Viela *et al*., 2020).

Consequently, the QIs may experience displacement through disturbance arising in association with vessel-based Proposed Activities in the vicinity of North-West Irish Sea cSPA.

Despite this, the potential for such effects resulting in significant adverse effects upon the COs of this QI is considered very unlikely for the following reasons:

- Additional above-water noise and visual disturbance associated with the Proposed Activities will represent a very small addition to baseline levels associated with existing moderate to high vessel traffic.
- As North-West Irish Sea cSPA lies adjacent to the major north-south shipping lane from Dublin Port, birds present may be accustomed to moderate to high levels of underwater noise, above-water noise and visual impacts associated with anthropogenic activities.
- The spatial footprints of individual survey activities are all outside of the SPA. Within the large majority of the Licence area, any underwater noise, above-water noise or visual impacts generated by survey activities would not be detectable.
- Any surveys which may result in novel forms of underwater noise stimuli (such as geophysical surveys or borehole drilling during geotechnical surveys) will occur within only brief windows during the Application period. Furthermore, the duration of these surveys at particular locations within the Licence area would be short (at most, for geotechnical borehole drilling, several days).
- Furthermore, based on what is known about the physiology of hearing in birds they do not hear well underwater and, therefore, are unlikely to be impacted when diving. Anatomical studies of ear structure in diving birds, such as Dooling and Therrien (2012), suggests that there are adaptations for protection against the large pressure changes that may occur while diving, which may protect the ear from damage due to acoustic over-exposure. In addition, unlike marine mammals, birds have the ability to stay above the water and escape the area by flying, therefore avoiding potential damage.
- If there are individuals associated with the SPA located within 2 km of the Licence area, as highlighted above, they will likely be habituated to anthropogenic noise do to the major shipping lane located between the Licence area and the SPA, however, it is considered that should they be subject to disturbance such that they are displaced, they will likely relocated to within the SPA or other suitable habitat nearby as there is ample suitable habitat accessible based on ranges provided by Woodward *et al.*, (2019), with displacement effects being significantly short-term and localised.

With regards to litter and pollution both the assessment and mitigation for this site is the same as South Dublin Bay and River Tolka Estuary SPA in Section 5.1.1.

Conclusion

With consideration of all of the impacts above, and mitigating factors such as biology, baseline anthropogenic disturbance and the short-term and temporary nature of the Proposed Activities, it is concluded that there is negligible potential for effect. It is therefore concluded that there is no potential for AESI on the North-West Irish Sea SPA or its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.5 North Bull Island SPA

5.1.5.1 Waterbirds

The following assessment considers the following waterbird species:

- Light-bellied Brent goose – non-breeding
- Shelduck – non-breeding
- Shoveler – non-breeding
- Pintail – non-breeding
- Teal – non-breeding
- Oystercatcher – non-breeding
- Golden plover – non-breeding
- Grey plover – non-breeding
- Curlew – non-breeding
- Bar-tailed godwit – non-breeding
- Black-tailed godwit – non-breeding
- Turnstone – non-breeding
- Knot – non-breeding
- Sanderling – non-breeding
- Dunlin – non-breeding
- Redshank – non-breeding

Above-water noise, underwater noise and visual impacts

The assessment for these species and impacts is the same as that carried out in South Dublin Bay and River Tolka Estuary SPA in Section 5.1.1.1. However, mitigation is not required as the SPA is not within range such that disturbance will be experienced by birds within the SPA during the Proposed Activities. It is recognised that there is potential for some birds associated with the SPA to be impacted ex-situ whilst foraging or present within the Licence Area and potentially within the South Dublin and River Tolka Estuary SPA. However, they are considered likely to (if disturbed significantly enough to relocate) relocate to ample alternative suitable habitat located nearby, including the SPA (which is not subject to direct disturbance). Therefore, should disturbance occur, it will not occur at a level which will result in an adverse effect on the species impacted when considering the COs of the SPA.

Conclusions

Overall, it is concluded above-water noise, underwater noise and visual impacts will have a negligible effect on the QIs. It is therefore concluded that there is no potential for AESI on North Bull Island SPA or its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.5.2 Black-headed gull - non-breeding

Above-water noise, underwater noise and visual impacts

The assessment of this impact for this species in Section 5.1.1.3 is applicable and the same and conclusions are adopted.

Conclusions

Overall, it is concluded above-water noise, underwater noise and visual impacts will have a negligible effect on this QI. It is therefore concluded that there is no potential for AESI on North Bull Island SPA or its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.5.3 All QIs

Litter and pollution

Both the assessment and mitigation for this site is the same as South Dublin Bay and River Tolka Estuary SPA in Section 5.1.1.

Conclusion

Overall, it is concluded, all impacts will have a negligible effect on the QIs. It is therefore concluded that there is no potential for AESI on North Bull Island SPA or its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.6 Wicklow Head SPA

5.1.6.1 Kittiwake - breeding

Above-water noise, underwater noise and visual impacts

Breeding kittiwake from Wicklow Head SPA may experience disturbance or displacement in relation to above-water noise and visual impacts from Proposed Activities ex-situ when foraging, commuting through or carrying out other behaviours within the Licence area.

Although breeding kittiwakes have been observed to be highly tolerant of above-water noise and visual disturbance where nesting occurs in areas of high levels of anthropogenic activity (Coulson, 2011), information in relation to distances at which disturbances responses may occur around nesting sites is limited. Thompson, 2021, in a review of survey methods of kittiwake at offshore installations recommends a distance of 100 m be maintained to avoid potential disturbance. On the assumption that kittiwakes nesting on offshore anthropogenic structures may to some extent be habituated to human activity, then a more conservative, larger separation distance may be necessary to avoid disturbance responses for birds nesting in natural settings (as they do within Wicklow Head SPA).

Away from breeding colonies, within the marine environment, kittiwake display very low sensitivity to disturbance from vessel traffic and associated activities (Garthe & Hüppop, 2004, Bradbury *et al*., 2014, Fliessbach *et al*., 2019). Furthermore, this SPA lies less than 5 km from an industrialised port area (Wicklow) with moderate levels of vessel traffic and has a major vessel traffic route passing less than 2 km away. As such kittiwake from this SPA are likely to be accustomed to moderate to high levels of above-water noise and visual disturbance associated with vessel traffic.

Furthermore, the SPA lies 4.85 km from the Licence area, and therefore is outside of the range for individual to be disturbed within the SPA whilst the Proposed Activities are being carried out. Any birds associated with the SPA located within the Licence area, are considered likely to (if disturbed significantly enough to relocate despite

low sensitivity) relocate to ample alternative suitable habitat located nearby, including the SPA, and therefore have a negligible impact on the COs of the SPA.

Additionally, in an assessment of seabird sensitivities to adverse impacts from underwater tidal energy devices, Furness *et al*. (2012) scored kittiwake as '1' (the minimum score) in relation to their mean and maximum diving depths, citing mean diving depths of 0 m and maximum diving depths of 1 m (Cramp & Simmons, 1980).

This is consistent with a review of kittiwake foraging ecology undertaken by RPS on behalf of the Welsh Assembly (2011), which states:

> 'Black-legged kittiwakes obtain prey by snatching items from the surface or splash diving just below the surface (Ratcliffe, *et al*., 2000).'

The duration of such dives is described in Coulson (2011) as 'sometimes up to two seconds, but at other times they are scarcely submerged'.

As such, for any foraging behaviours in which kittiwake may be submerged within the water column, submersion durations are very brief (at most several seconds). This QI does not actively forage within the water column in such a way that underwater noise impacts might affect its foraging behaviour.

Furthermore, based on what is known about the physiology of hearing in birds they do not hear well underwater and, therefore, are unlikely to be impacted when diving. Anatomical studies of ear structure in diving birds, such as Dooling and Therrien (2012), suggests that there are adaptations for protection against the large pressure changes that may occur while diving, which may protect the ear from damage due to acoustic over-exposure. In addition, unlike marine mammals, birds have the ability to stay above the water and escape the area by flying, therefore avoiding potential damage.

There are no potential adverse impacts to any COs identified for kittiwake as a result of above water, underwater noise or visual impacts. There will be no adverse effects upon site integrity as a result of the above impacts considered from the Proposed Activities alone.

Litter and pollution

Both the assessment and mitigation for this site is the same as South Dublin Bay and River Tolka Estuary SPA in Section 5.1.1.

Conclusions

Overall, it is concluded all impacts will have a negligible effect on the QIs. It is therefore concluded that there is no potential for AESI on Wicklow Head SPA or its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.7 Howth Head Coast SPA

5.1.7.1 Kittiwake - breeding

Above-water noise, underwater noise and visual impacts

The assessment for this site is the same as Wicklow Head SPA in Section 5.1.6.1.

Potential adverse effects to any COs identified for kittiwake as a result of above-water and underwater noise and visual impacts would be negligible. There will be no adverse effects upon site integrity as a result of above-water noise and visual impacts from the Proposed Activities alone.

Litter and pollution

Both the assessment and mitigation for this site is the same as South Dublin Bay and River Tolka Estuary SPA in Section 5.1.1.

Conclusions

Overall, it is concluded all impacts will have a negligible effect on the QIs. It is therefore concluded that there is no potential for AESI on Howth Head Coast SPA or its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.8 Ireland's Eye SPA

5.1.8.1 Seabirds

The following assessment considers the following seabird species:

- Herring gull – breeding & non-breeding
- Kittiwake – breeding & non-breeding
- Cormorant – breeding & non-breeding
- Guillemot – breeding & non-breeding
- Razorbill – breeding & non-breeding

Above-water noise, underwater noise and visual impacts

Breeding (and wintering) seabird QIs from Ireland's Eye SPA may experience potential above-water noise and visual impacts in association with vessel-based activities during Proposed Activities when foraging, commuting through or carrying out other behaviours within the Licence area. Breeding (and wintering) seabirds can be disturbed or displaced by above-water noise and/or visual impacts, although information to allow attribution of causation to one or the other is lacking.

Kittiwake and herring gull show comparatively low sensitivities to vessel disturbance (Fleissbach *et al*., 2019), while cormorant, guillemot and razorbill are considered to be of moderate sensitivity to disturbance from vessel traffic (Garthe & Hüppop, 2004; Bradbury *et al*., 2014).

However, as Ireland's Eye SPA lies adjacent to Howth, an active port with regular vessel traffic and within 5 km of north-bound shipping routes from Dublin port, QIs are likely to be accustomed to a moderate to high levels of above-water noise and visual disturbance associated with anthropogenic activities.

Furthermore, above-water noise and visual impacts from vessel-based survey activities within the Licence area are considered unlikely to result in adverse effects upon the COs of these QIs because:

- The spatial footprints of individual survey activities within the Licence area at any given time will occupy only a minimal proportion of the overall Licence area. Within the large majority of the Licence area, any above-water noise and visual impacts generated by survey activities would not be detectable; and

- Any surveys which may result in novel forms of above-water noise or visual stimuli (such as borehole drilling during geotechnical surveys) will occur within only brief windows during the Application period. Furthermore, the duration of these surveys at particular locations within the Licence area would occur over short durations (several days at most for geotechnical borehole drilling).

As such, for all QIs, above-water noise and visual impacts are considered to be negligible. Therefore, it is concluded that there will be no adverse effects upon site integrity as a result of the Proposed Activities alone.

As the principal foraging technique used by cormorant, guillemot and razorbill is active pursuit hunting of prey within the water column during dives of prolonged durations (Snow & Perrins, 1998), these QIs may experience underwater noise impacts in such a way as to impact their foraging behaviours and lead to displacement effects.

The potential for such effects resulting in significant adverse effects upon the COs of these QIs is, however, considered very unlikely for the following reasons:

- The majority of additional underwater noise associated with Proposed Activities will result from a comparatively very small additional amount of vessel traffic within the Licence area where baseline vessel traffic levels are moderate to high;
- Ireland's Eye SPA lies adjacent to Howth, an active port with regular vessel traffic and within 5 km of north-bound shipping routes from Dublin port, birds present are likely to be accustomed to a moderate to high levels of underwater noise disturbance associated with anthropogenic activities;
- The spatial footprints of individual survey activities within the Licence area at any given time will occupy only a minimal proportion of the overall Licence area. Within the large majority of the Licence area, any underwater noise generated by survey activities would not be detectable; and
- Any surveys which may result in novel forms of underwater noise stimuli (such as geophysical surveys or borehole drilling during geotechnical surveys) will occur within only brief windows during the Application period. Furthermore, the duration of these surveys at particular locations within the Licence area would occur over short durations (at most, for geotechnical borehole drilling, several days).
- Furthermore, based on what is known about the physiology of hearing in birds they do not hear well underwater and, therefore, are unlikely to be impacted when diving. Anatomical studies of ear structure in diving birds, such as Dooling and Therrien (2012), suggests that there are adaptations for protection against the large pressure changes that may occur while diving, which may protect the ear from damage due to acoustic over-exposure. In addition, unlike marine mammals, birds have the ability to stay above the water and escape the area by flying, therefore avoiding potential damage.

As such, for cormorant, guillemot and razorbill, underwater noise impacts are considered to be negligible. Therefore, it is concluded that there will be no adverse effects upon site integrity as a result of the Proposed Activities alone.

In an assessment of seabird sensitivities to adverse impacts from underwater tidal energy devices, Furness *et al*. (2012) scored kittiwake and herring gull as '1' (the minimum score) in relation to their mean and maximum diving depths, citing mean diving depths of 0 m and maximum diving depths of 1 m (Cramp & Simmons, 1980).

This is consistent with a review of seabird foraging ecology undertaken by RPS on behalf of the Welsh Assembly (2011), which states:

'The herring gull uses various methods of feeding: (i) dipping-to-surface to take items on or just below surface; (ii) surface-plunging, from 5–6 m; (iii) surface-seizing, on occasion immersing head and front part of body; and (iv) shallow surface-diving (Snow & Perrins, 1998).'

'Black-legged kittiwakes obtain prey by snatching items from the surface or splash diving just below the surface (Ratcliffe, *et al*., 2000).'

The duration of such dive by kittiwake is described in Coulson (2011) as 'sometimes up to two seconds, but at other times they are scarcely submerged'.

As such, for any foraging behaviours in which herring gull or kittiwake may be submerged within the water column, submersion durations are very brief (at most several seconds). These QIs do not actively forage within the water column in such a way that underwater noise impacts might affect their foraging behaviour.

There are no potential adverse impacts to any COs identified for herring gull or kittiwake as a result of underwater noise impacts. There will be no adverse effects upon site integrity as a result of underwater noise impacts from the Proposed Activities alone.

Litter and pollution

Both the assessment and mitigation for this site is the same as South Dublin Bay and River Tolka Estuary SPA in Section 5.1.1.

Conclusions

Overall, it is concluded all impacts will have a negligible effect on the QIs. It is therefore concluded that there is no potential for AESI on Ireland's Eye SPA or its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.9 Baldoyle Bay SPA

5.1.9.1 Waterbirds

The following assessment considers the following waterbird species:

- Light-bellied Brent goose – non-breeding
- Shelduck – non-breeding
- Ringed plover – non-breeding
- Golden plover – non-breeding
- Grey plover – non-breeding
- Bar-tailed godwit – non-breeding

Above-water noise and visual impacts

The assessment for these species and impacts is the same as that carried out in South Dublin Bay and River Tolka Estuary SPA in Section 5.1.1.1. However, mitigation is not required as the SPA is not within range such that disturbance will be experienced by birds within the SPA during the Proposed Activities. Any birds associated with the SPA located within the Licence area, are considered likely to (if disturbed significantly enough to relocate) relocate to ample alternative suitable habitat located nearby, including the SPA (which is not subject to direct disturbance). Therefore, should disturbance occur, it will not occur at a level which will result in an adverse effect on the species impacted when considering the COs of the SPA.

Litter and pollution

Both the assessment and mitigation for this site is the same as South Dublin Bay and River Tolka Estuary SPA in Section 5.1.1.

Conclusions

Overall, it is concluded all impacts will have a negligible effect on the QIs. It is therefore concluded that there is no potential for AESI on Baldoyle Bay SPA or its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.10 Wicklow Mountain SPA

5.1.10.1 Raptors

The following assessment considers the following raptor species:

- Merlin – breeding & non-breeding
- Peregrin – breeding & non-breeding

Litter and pollution

Both the assessment and mitigation for this site is the same as South Dublin Bay and River Tolka Estuary SPA in Section 5.1.1.

Conclusions

Overall, it is concluded, litter and pollution will have a negligible effect on the QIs. It is therefore concluded that there is no potential for AESI on Wicklow Mountain SPA or its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.11 Malahide Estuary SPA

5.1.11.1 Waterbirds

The following assessment considers the following waterbird species:

- Light-bellied Brent goose – non-breeding
- Shelduck – non-breeding
- Pintail – non-breeding
- Oystercatcher – non-breeding
- Golden plover – non-breeding
- Grey plover – non-breeding
- Knot – non-breeding
- Dunlin – non-breeding
- Black-tailed godwit – non-breeding
- Bar-tailed godwit – non-breeding
- Redshank – non-breeding

Above-water noise and visual impacts

The assessment for these species and impacts is the same as that carried out in South Dublin Bay and River Tolka Estuary SPA in Section 5.1.1.1. However, mitigation is not required as the SPA is not within range such that disturbance will be experienced by birds within the SPA during the Proposed Activities. Any birds associated with the SPA located within the Licence area, are considered likely to (if disturbed significantly enough to relocate) relocate to ample alternative suitable habitat located nearby, including the SPA (which is not subject to direct disturbance). Therefore, should disturbance occur, it will not occur at a level which will result in an adverse effect on the species impacted when considering the COs of the SPA.

5.1.11.2 Diving Waterbirds

The following assessment considers the following diving waterbird species:

- Great crested grebe - non-breeding
- Goldeneye - non-breeding
- Red-breasted merganser - non-breeding

Above-water noise and visual impacts

Wintering diving waterbird QIs from Malahide SPA may also utilise habitats within South Dublin Bay and River Tolka Estuary SPA or North Bull Island SPA, as individuals may move between these relatively close sites (<15 km separation). Parts of the South Dublin Bay and River Tolka Estuary either overlap with the Licence area or lie within the distances at which QIs may experience disturbance or displacement effects. As such, there is the potential for Proposed Activities to have ex-situ impacts upon QIs from Malahide Estuary SPA.

Mitigation measures identified to minimise the effects of above-water and visual impacts upon waterbird QIs from Dublin Bay, do not account for the differing habitat use of these QIs, which may utilise marine habitats within South Dublin Bay and River Tolka Estuary SPA or North Bull Island SPA.

Despite this, given the nature of Proposed Activities, above-water noise and visual impacts from vessel-based survey activities within the Licence area are considered unlikely to result in adverse effects upon the COs of these QIs because:

- The spatial footprints of individual survey activities within the Licence area at any given time will occupy only a minimal proportion of the overall Licence area. Within the large majority of the Licence area, any above-water noise and visual impacts generated by survey activities would not be detectable; and
- Any surveys which may result in novel forms of above-water or visual stimuli (such as borehole drilling during geotechnical surveys) will occur within only brief windows during the Application period. Furthermore, the duration of these surveys at particular locations within the Licence area would occur over short durations (several days at most for geotechnical borehole drilling).
- Any birds associated with the SPA located within the Licence area or within range of disturbance, are considered likely to (if disturbed significantly enough to relocate despite low sensitivity) relocate to ample alternative suitable habitat located nearby, including the SPA, and therefore have a negligible impact on the COs of the SPA.

As such, for all QIs, above-water noise and visual impacts are considered to be negligible. Therefore, it is concluded that there will be no adverse effects upon site integrity as a result of the Proposed Activities alone.

Underwater noise

As the principal foraging technique used by great crested grebe, goldeneye and red-breasted merganser is active pursuit hunting of prey within the water column during dives of prolonged durations (Snow & Perrins,

1998), these QIs may experience underwater noise impacts in such a way as to impact their foraging behaviours and lead to displacement effects.

As such, these QIs may theoretically experience ex-situ impacts should they forage in parts of South Dublin Bay and River Tolka Estuary SPA or North Bull Island SPA.

Despite this, the potential for such effects resulting in significant adverse effects upon the COs of these QIs is, however, considered very unlikely for the following reasons:

- The majority of additional underwater noise associated with Proposed Activities will result from a comparatively very small additional amount of vessel traffic within the Licence area where baseline vessel traffic levels are moderate to high;
- For all QIs, however, as South Dublin Bay and River Tolka SPA and North Bull Island SPA lie adjacent to Dublin Port, an active port with regular vessel large traffic, birds present are likely to be accustomed to a moderate to high level of underwater noise disturbance associated with anthropogenic activities;
- The spatial footprints of individual survey activities within the Licence area at any given time will occupy only a minimal proportion of the overall Licence area. Within the large majority of the Licence area, any underwater noise generated by survey activities would not be detectable; and
- Any surveys which may result in novel forms of underwater noise stimuli (such as geophysical surveys or borehole drilling during geotechnical surveys) will occur within only brief windows during the Application period. Furthermore, the duration of these surveys at particular locations within the Licence area would occur over short durations (at most, for geotechnical borehole drilling, several days).
- Furthermore, based on what is known about the physiology of hearing in birds they do not hear well underwater and, therefore, are unlikely to be impacted when diving. Anatomical studies of ear structure in diving birds, such as Dooling and Therrien (2012), suggests that there are adaptations for protection against the large pressure changes that may occur while diving, which may protect the ear from damage due to acoustic over-exposure. In addition, unlike marine mammals, birds have the ability to stay above the water and escape the area by flying, therefore avoiding potential damage.

As such, for great crested grebe, goldeneye and red-breasted merganser, underwater noise impacts are considered to be negligible. Therefore, it is concluded that there will be no adverse effects upon site integrity as a result of the Proposed Activities alone.

Litter and pollution

Both the assessment and mitigation for this site is the same as South Dublin Bay and River Tolka Estuary SPA in Section 5.1.1.

Conclusions

Overall, it is concluded all impacts will have a negligible effect on the QIs. It is therefore concluded that there is no potential for AESI on Malahide Estuary SPA or its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.12 Lambay Island SPA

5.1.12.1 Seabirds

The following assessment considers the following seabird species:

- Fulmar - breeding
- Herring gull - breeding & non-breeding

- Kittiwake - breeding
- Guillemot - breeding
- Razorbill - breeding
- Puffin - breeding

Above-water noise and visual impacts

Breeding (and wintering) seabird QIs from Lambay Island SPA may experience potential above-water noise and visual impacts in association with vessel-based activities during Proposed Activities when foraging, commuting through or carrying out other behaviours within the Licence area. Breeding (and wintering) seabirds can be disturbed or displaced by above-water noise and/or visual impacts, although information to allow attribution of causation to one or the other is lacking.

Kittiwake, herring gull and puffin show comparatively low sensitivities to vessel disturbance (Garthe & Hüppop, 2004; Bradbury *et al*., 2014; Fleissbach *et al*., 2019). Fulmar show very low sensitivities to vessel disturbance (Garthe & Hüppop, 2004; Bradbury *et al*., 2014). While guillemot and razorbill are considered to be of moderate sensitivity to disturbance from vessel traffic (Garthe & Hüppop, 2004; Bradbury *et al*., 2014).

Furthermore, above-water noise and visual impacts from vessel-based survey activities within the Licence area are considered unlikely to result in adverse effects upon the COs of these QIs because:

- The spatial footprints of individual survey activities within the Licence area at any given time will occupy only a minimal proportion of the overall Licence area. Within the large majority of the Licence area, any above-water noise and visual impacts generated by survey activities would not be detectable; and
- Any surveys which may result in novel forms of above-water noise or visual stimuli (such as borehole drilling during geotechnical surveys) will occur within only brief windows during the Application period. Furthermore, the duration of these surveys at particular locations within the Licence area would occur over short durations (several days at most for geotechnical borehole drilling).

As such, for all QIs, above-water noise and visual impacts are considered to be negligible. Therefore, it is concluded that there will be no adverse effects upon site integrity as a result of the Proposed Activities alone.

Underwater noise

As the principal foraging technique used by guillemot, razorbill and puffin is active pursuit hunting of prey within the water column during dives of prolonged durations (Snow & Perrins, 1998), these QIs may experience underwater noise impacts in such a way as to impact their foraging behaviours and lead to displacement effects.

The potential for such effects resulting in significant adverse effects upon the COs of these QIs is however, considered very unlikely for the following reasons:

- The majority of additional underwater noise associated with Proposed Activities will result from a comparatively very small additional amount of vessel traffic within the Licence area where baseline vessel traffic levels are moderate to high;
- The spatial footprints of individual survey activities within the Licence area at any given time will occupy only a minimal proportion of the overall Licence area. Within the large majority of the Licence area, any underwater noise generated by survey activities would not be detectable;
- Any surveys which may result in novel forms of underwater noise stimuli (such as geophysical surveys or borehole drilling during geotechnical surveys) will occur within only brief windows during the Application period. Furthermore, the duration of these surveys at particular locations within the Licence area would occur over short durations (at most, for geotechnical borehole drilling, several days); and
- Furthermore, based on what is known about the physiology of hearing in birds they do not hear well underwater and, therefore, are unlikely to be impacted when diving. Anatomical studies of ear structure in diving birds, such as Dooling and Therrien (2012), suggests that there are adaptations for protection against the large pressure changes that may occur while diving, which may protect the ear from damage due to

acoustic over-exposure. In addition, unlike marine mammals, birds have the ability to stay above the water and escape the area by flying, therefore avoiding potential damage.

As such, for guillemot, razorbill and puffin underwater noise impacts are considered to be negligible. Therefore, it is concluded that there will be no adverse effects upon site integrity as a result of the Proposed Activities alone.

In an assessment of seabird sensitivities to adverse impacts from underwater tidal energy devices, Furness *et al*. (2012) scored kittiwake, herring gull and fulmar as '1' (the minimum score) in relation to their mean and maximum diving depths, citing mean diving depths of 0 m and maximum diving depths of 1 m (Cramp & Simmons, 1980).

This is consistent with a review of seabird foraging ecology undertaken by RPS on behalf of the Welsh Assembly (2011), which states:

'The herring gull uses various methods of feeding: (i) dipping-to-surface to take items on or just below surface; (ii) surface-plunging, from 5–6 m; (iii) surface-seizing, on occasion immersing head and front part of body; and (iv) shallow surface-diving (Snow & Perrins, 1998).'

'Northern fulmar are surface feeders, but they also splash-dive (Hudson and Furness 1988) or surface dive down to c. 3 m (Hobson and Welch, 1992). Maximum recorded dive depths range from 3 m (Garthe and Furness, 2001) to 4 m (Snow and Perrins, 1998).'

'Black-legged kittiwakes obtain prey by snatching items from the surface or splash diving just below the surface (Ratcliffe, *et al*., 2000).'

The duration of such dive by kittiwake is described in Coulson (2011) as 'sometimes up to two seconds, but at other times they are scarcely submerged'.

As such, for any foraging behaviours in which herring gull, kittiwake or fulmar may be submerged within the water column, submersion durations are very brief (at most several seconds). These QIs do not actively forage within the water column in such a way that underwater noise impacts might affect their foraging behaviour.

There are no potential adverse impacts to any COs identified for herring gull, kittiwake or fulmar as a result of underwater noise impacts. There will be no adverse effects upon site integrity as a result of underwater noise impacts from the Proposed Activities alone.

Conclusions

Overall, it is concluded all impacts will have a negligible effect on the QIs. It is therefore concluded that there is no potential for AESI on Lambay Island SPA or its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.13 Rockabill SPA

5.1.13.1 Tern Species

The following assessment considers the following tern species:

- Arctic tern – breeding
- Roseate tern – breeding
- Common tern – breeding

Above-water noise and visual impacts

The assessment for this site is the same as Dalkey Islands SPA in Section 5.1.3.1.

Conclusion

With consideration of above-water noise and visual impacts above, and mitigating factors such as biology, baseline anthropogenic disturbance, mitigation implemented and the short-term and temporary nature of the Proposed Activities it is concluded there is negligible potential for effect. It is therefore concluded that there is no potential for AESI on Rockabill SPA and its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.14 River Nanny Estuary and Shore SPA

5.1.14.1 Herring gull - non-breeding

Above-water noise and visual impacts

The assessment for these species and impacts is the same as that carried out in South Dublin Bay and River Tolka Estuary SPA in Section 5.1.1.1. However, mitigation is not required as the SPA is not within range such that disturbance will be experienced by birds within the SPA during the Proposed Activities. It is recognised that there is potential for some birds associated with the SPA to be impacted ex-situ whilst foraging or present within the Licence Area, however, they are considered likely to (if disturbed significantly enough to relocate) relocate to ample alternative suitable habitat located nearby, including the SPA (which is not subject to direct disturbance). Therefore, should disturbance occur, it will not occur at a level which will result in an adverse effect on the species impacted when considering the COs of the SPA.

Conclusions

Overall, it is concluded above-water noise and visual impacts will have a negligible effect on the QI. It is therefore concluded that there is no potential for AESI on River Nanny Estuary and Shore SPA and its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.15 Skerries Islands SPA

5.1.15.1 Herring gull - breeding & non-breeding

Above-water noise and visual impacts

Breeding (and wintering) herring gull from Skerries Islands SPA may experience potential above-water noise and visual impacts in association with vessel-based activities during the Proposed Activities when foraging, commuting through or carrying out other behaviours within the Licence area. Breeding (and wintering) seabirds can be disturbed or displaced by above-water noise and/or visual impacts, although information to allow attribution of causation to one or the other is lacking.

Away from breeding colonies, within the marine environment, herring gull display very low sensitivity to disturbance from vessel traffic and associated activities (Fliessbach *et al*., 2019).

Furthermore, the SPA lies > 29 km from the Licence area and therefore is outside of the range for individual to be disturbed within the SPA whilst the Proposed Activities are being carried out. Any birds associated with the SPA located within the Licence area, are considered likely to (if disturbed significantly enough to relocate despite low sensitivity) relocate to ample alternative suitable habitat located nearby, including the SPA, and therefore have a negligible impact on the COs of the SPA.

Conclusions

Overall, it is concluded all impacts will have a negligible effect on the QI. It is therefore concluded that there is no potential for AESI on Skerries Islands SPA or its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.16 Seas off Wexford SPA

The Seas off Wexford SPA is a unique SPA in that it is solely an important resource for marine birds and not where colonies are located. The estuaries and bays that open into it along with connecting coastal stretches of intertidal and shallow subtidal habitats, provide safe feeding and rooting habitats through winter and migratory periods. These areas, along with the more pelagic marine waters further offshore, provide additional supporting habitats for seabirds that breed in colonies from other nearby designated sites.

5.1.16.1 Birds Related to Nearby Breeding Colonies within other SPA

The following bird species are considered within other SPAs within this assessment:

- Fulmar (Saltee Islands SPA)
- Gannet (Saltee Islands SPA)
- Lesser black-backed gull (Saltee Islands SPA)
- Puffin (Saltee Islands SPA)
- Herring gull (Saltee Islands SPA)

All Impacts

All of the above species are designated as QIs of the Seas off Wexford SPA, in relation to Seas off Wexford SPA comprising of foraging and roosting habitat for breeding and/or wintering colonies that are covered by other SPAs (which are clarified within the COs). The Seas off Wexford SPA is located 50km from the Licence area and therefore there is negligible risk of disturbance to QIs within the SPA. There is therefore no potential for AESI as there is no pathway for effect, as their source considered to not be the Seas off Wexford SPA but the wintering or breeding colony designated sites they are associated with, acknowledging they do use the Seas off Wexford SPA as a resource.

Conclusion

Overall, with consideration of the nature of the Seas of Wexford SPA as a marine area, and how it is used, it is therefore concluded that there is no potential for AESI on the Seas off Wexford SPA or its

COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.17 Dundalk Bay SPA

5.1.17.1 Gull Species

The following assessments consider the following gull species:

- Black-head gull - non-breeding
- Common gull - non-breeding
- Herring gull - non-breeding

Above-water noise and visual impacts

The assessment for these species and impacts is the same as that carried out in South Dublin Bay and River Tolka Estuary SPA in Section 5.1.1.1. However, mitigation is not required as the SPA is distant enough such that no disturbance will be experienced by birds within the SPA during the Proposed Activities. It is recognised that there is potential for some birds associated with the SPA to be impacted ex-situ whilst foraging or present within the Licence Area, however, they are considered likely to (if disturbed significantly enough to relocate) relocate to ample alternative suitable habitat located nearby, including the SPA (which is not subject to direct disturbance). Therefore, should disturbance occur, it will not occur at a level which will result in an adverse effect on the species impacted when considering the COs of the SPA.

Conclusions

Overall, it is concluded above-water noise and visual impacts will have a negligible effect on the QIs. It is therefore concluded that there is no potential for AESI on Dundalk Bay SPA and its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.1.18 Wexford Harbour and Slobs SPA

5.1.18.1 Lesser black-backed gull - non-breeding

Visual impacts

Wintering lesser black-backed gull from Wexford Harbour and Slobs SPA may forage within the Licence Area in offshore areas. In doing so these QIs may thereby experience potential ex-situ impacts in association with Proposed Activities.

Lesser black-backed gull show comparatively low sensitivities to vessel disturbance (Fleissbach *et al*., 2019). Furthermore, this species are notably tolerant of anthropogenic disturbance, with wintering habitats including extensive use of urban areas (Snow and Perrins, 1998). With this in consideration it is concluded that disturbance from the Proposed Activities will have a negligible effect.

Underwater noise

In an assessment of seabird sensitivities to adverse impacts from underwater tidal energy devices, Furness *et al*. (2012) scored lesser black-backed gull as '1' (the minimum score) in relation to their mean and maximum diving depths, citing mean diving depths of 0 m and maximum diving depths of 1 m (Cramp & Simmons, 1980).

This is consistent with a review of seabird foraging ecology undertaken by RPS on behalf of the Welsh Assembly (2011), which states:

'[Lesser black-backed gull foraging methods] include dipping-to-surface (contact type), surface-plunging, and shallow plunge-diving for up to two seconds (Snow and Perrins, 1998). Strann and Vader (1992) observed plunge-diving for sea urchins, blue mussels and other marine invertebrates in shallow water (less than about 1 m deep).'

As such, for any foraging behaviours in which lesser black-backed gull may be submerged within the water column, submersion durations are very brief (at most several seconds). This QI does not actively forage within the water column in such a way that underwater noise impacts might affect its foraging behaviour.

Furthermore, based on what is known about the physiology of hearing in birds they do not hear well underwater and, therefore, are unlikely to be impacted when diving. Anatomical studies of ear structure in diving birds, such as Dooling and Therrien (2012), suggests that there are adaptations for protection against the large pressure changes that may occur while diving, which may protect the ear from damage due to acoustic over-exposure. In addition, unlike marine mammals, birds have the ability to stay above the water and escape the area by flying, therefore avoiding potential damage.

Conclusions

Overall, it is concluded underwater noise and visual impacts, with the implementation of mitigation measures, will have a negligible effect on the QI. It is therefore concluded that there is no potential for on Wexford Harbour and Slobs SPA and its COs as a result of the Proposed Activities. As there will be negligible effects on the site, the site and associated impacts are therefore screened out of the in-combination assessment.

5.2 Marine Mammals and other Annex 2 Species

5.2.1 Harbour Porpoise

The following sites are considered for assessment of impacts on harbour porpoise.

Irish Sites:

- Rockabill to Dalkey Island SAC
- Codling Fault Zone SAC
- Lambay Island SAC
- Blackwater Bank SAC
- Carnsore Point SAC
- Hook Head SAC

Transboundary UK Sites:

- North Anglesey Marine SAC
- West Wales Marine SAC
- North Channel SAC
- Bristol Channel Approaches SAC

All of their COs (where they exist) are included in Table 9.2 in Appendix A. Where COs for Irish designated sites have not been set for the QI, the closest designated site with relevant COs has been considered instead.

5.2.1.1 Rockabill to Dalkey Island

PTS or TTS from increased anthropogenic noise

The sound emitted by geophysical and geotechnical survey equipment has the potential to induce the onset of PTS or TTS when the frequencies emitted by the equipment fall within the species' hearing ranges. Harbour porpoise are within the very high frequency cetacean group with a hearing range of 0.2 – 180 kHz.

Geophysical survey equipment emits pulsed sound, and Southall *et al*. (2019) provide thresholds for received pulsed sound levels that have the potential to induce the onset of instantaneous PTS and TTS in harbour porpoise which are:

PTS – 202 dB re 1 µPa

TTS – 196 dB re 1 µPa

The following typical geophysical survey equipment is proposed:

- Multibeam echosounder (MBES)
- Side Scan Sonar (SSS)
- Magnetometer(s)/gradiometer
- Sub Bottom Profiler (SBP)
- Ultra-High Resolution Seismic (UHRS)
- Ultra-Short Baseline (USBL) positioning equipment

Of these, the magnetometer/gradiometer is passive and emits no sound, so has no potential to cause any effect. All MBES and SSS utilised on the Proposed Activities will operate outside the hearing frequency threshold of all harbour porpoise (i.e., above 200 kHz) and as such have no potential to induce the onset of PTS or TTS in any QI.

The SBP and UHRS operate across a range of relatively low frequencies (e.g., 0.2 – 16 kHz) and thus overlap the range of harbour porpoise. These pieces of equipment can also emit sound at relatively high intensities (up to and including 247 dB re 1 µPa) and as such have the potential to induce the onset of PTS and TTS in marine mammal QIs in the absence of mitigation. The USBL operates over a wide frequency range (e.g., 18- 55 kHz), with sound levels of up to 207 dB re 1 µPa. USBLs therefore have the potential to induce the onset of PTS and TTS in harbour porpoise in the absence of mitigation.

Geotechnical sampling techniques emit non-pulsed, i.e., continuous, sound. Southall *et al*. (2007) provide thresholds for received non-pulsed sound levels that have the potential to induce the onset of instantaneous PTS in each hearing group (no thresholds exist for non-pulsed instantaneous TTS). The threshold for PTS in harbour porpoise is 230 dB re 1 µPa.

The following geotechnical sampling techniques are proposed:

- Borehole
- Cone penetration test (CPT) / Seismic CPT
- Vibrocore

Operating frequencies of the above sampling techniques are within the audible range of harbour porpoise. Due to the low levels of sound predicted (124 – 194 dB re 1 µPa), no instantaneous PTS onset is predicted to arise as a result of geotechnical surveys.

There is no potential for PTS or TTS from the ADCP equipment because it's operating frequency falls outside the hearing range of cetaceans.

Mitigation

Guidance for risk mitigation of maritime sound-producing activities including geophysical acoustic surveys and drilling was issued by the Department of Arts, Heritage and the Gaeltacht (DAHG, now DTCAGSM) in 2014.

This guidance will be implemented for all geophysical and geotechnical surveys, with the following exceptions which are based on contemporary research, guidance, and analysis of the Proposed Activities:

- Mitigation will be implemented for all audible sources where there is potential for instantaneous TTS or PTS onset;
- In situations where effective visual monitoring is not possible prior to sound-producing activities, passive acoustic monitoring (PAM) will be undertaken by a suitably qualified operator to allow work to proceed. PAM is a well-established technique used worldwide for real-time monitoring of the presence of marine mammals during mitigation work (e.g., to negate the potential for instantaneous auditory injury during geophysical and geotechnical survey work). The use of PAM was integrated into the Joint Nature Conservation Committee (JNCC) guidelines as early as 2002 and is now a standard tool for marine mammal mitigation (and other) work. Recent documentation by the Irish Whale and Dolphin Group (IWDG; "IWDG Policy on Offshore Windfarm Development") published in 2020 proposes that PAM should be adopted into standard mitigation protocols for Irish waters;
- Due to the low level of potential risk (compared to true seismic surveys), the high directionality of the sound source and the proximity to the sound source to the seabed compared to true seismic surveys), the monitored zone for seismic equipment/techniques (UHRS, seismic borehole – sparker and airgun, if required) will be 500 m (rather than 1,000 m); and
- For the reasons outlined above, ramp up procedures (for the UHRS) will be conducted over 20 minutes (rather than 40 minutes).

In addition, all MBES and SSS utilised on the Proposed Activities will operate outside the hearing frequency thresholds of all species (i.e., above 200 kHz) and as such have no potential to induce PTS or TTS in any QI.

These actions will ensure that the potential for instantaneous PTS or TTS onset will be negligible (through ensuring adequate separation of animals from the survey equipment to ensure sufficient attenuation of sound is achieved), thereby ensuing no adverse effects on the COs, and no adverse effects on site integrity from the Proposed Activities alone.

Disturbance from increased anthropogenic noise

With the exception of the SBP, UHRS and USBL, the sound emitted by the equipment will not be audible to harbour porpoise because the frequencies over which the equipment (MBES, SSS) operates will be higher than the higher frequency hearing cut-offs for their hearing group.

It is possible that the SBP, UHRS and USBL may be detected by harbour porpoise, therefore their use may have the potential to cause a behavioural response (i.e., spatial avoidance). The Joint Nature Conservation Committee (JNCC) recommend a likely conservative effective deterrence range (EDR) of 5 km for other geophysical surveys (including SBP; JNCC, 2020). As the geotechnical survey work will emit considerably lower levels of noise, it is considered that a 5 km EDR overly covers the spatial extent of any behavioural effects likely to arise.

A total of 9.2% (25.14 km²) of the Rockabill to Dalkey Island SAC overlaps with the Licence area, behavioural effects, including spatial avoidance, within the SAC boundary may occur during the Proposed Activities. Based on a 5 km EDR from the licence area, there is an increase to the potential area affected by the Proposed Activities of to up to 31.1% (84.75 km²) of the SAC in total, when activities are being undertaken at the northern end of the Licence area. None of the SAC will be affected when work is being undertaken beyond 5 km from the SAC boundary. Harbour porpoises are not confined to the SAC.

On cessation of activities, it is considered that usage of the affected area by species will return to pre-survey levels, as has been observed following other noise emitting activities such as seismic surveys and piling events

(Thompson *et al*., 2013; Vallejo *et al*., 2017); harbour porpoise have been observed to return to areas affected by noise producing activities within as little as three to four hours following cessation (Thompson *et al*., 2013), i.e., within the same day. It is considered that usage of any affected areas will return to pre-survey levels as has been observed following seismic surveys and piling events in other areas of high quality porpoise habitat (Thompson *et al*., 2013; Vallejo *et al*., 2017).

The COs for this site specifically consider disturbance in the context of not introducing anthropogenic energy (e.g. aerial or underwater noise, light or thermal) at levels that could result in a significant negative impact on individuals and/or the community of harbour porpoise within the site, deterioration of key resources due to human activity, and death and/ or injury to individuals to an extent that would affect the harbour porpoise community. With consideration that the works are temporary and short-term, and the mitigation considered above, it's concluded that the species will not be disturbed to the extent that the community will be impacted.

Mortality or injury from collision events (with vessels)

Vessel strikes are a known cause of mortality in marine mammals (Laist *et al*., 2001). Non-lethal collisions have also been documented (Laist *et al*., 2001; Van Waerebeek *et al*., 2007). Injuries from such collisions can be divided into two broad categories: blunt trauma from impact and lacerations from propellers. Injuries may result in individuals becoming vulnerable to secondary infections. Slower vessels, following a consistent trajectory, allow animals the opportunity to avoid collisions. The risk of fatality is also reduced if vessels are moving slowly.

Avoidance behaviour by harbour porpoise is often associated with fast, unpredictable boats such as speedboats and jet-skis (Bristow and Reeves, 2001; Gregory and Rowden, 2001; Leung and Leung, 2003; Buckstaff, 2004), while neutral or positive reactions have been observed with larger, slower moving vessels such as cargo ships (Leung and Leung, 2003; Sini *et al*., 2005). Harbour porpoise are considered to be more agile than the large whales and have been shown to avoid ships e.g., Palka and Hammond (2001).

Due to the nature of the Proposed Activities, the vessels will either be:

- Following a pre-defined linear route at low to moderate working speeds (geophysical survey);
- Stationary (geotechnical survey when sampling); or
- Transiting in a predictable manner (geotechnical survey when travelling between sampling locations).

Therefore, it will be easy for animals to predict their path and avoid them, which will greatly reduce the risk of collision. The risk is also reduced when vessels are slow moving (Vanderlaan and Taggart, 2007). Therefore, the potential for adverse effects resulting from collision is considered to be negligible.

In addition, it is considered that the small number of additional vessels associated with the Proposed Activities will not significantly increase the high level of vessel traffic which already uses the western Irish Sea, and therefore will not present a more significant risk of collision than animals currently experience.

Therefore, considering the negligible risk of collision which is not elevated beyond the baseline arising from the high level of vessel traffic already in the area, it is concluded that no adverse effects on any COs will occur, and no adverse effects on the site integrity from the Proposed Activities alone.

Mortality or reduced health / fitness from pollution events or littering

Littering or pollution events arising from Proposed Activities may directly impact on the fitness or health of harbour porpoise prey species or supporting habitats.

Mitigation

In order to ensure no adverse effects on harbour porpoise, all vessels undertaking survey works will adhere to MARPOL requirements, which provide an international standard for the safe management and operation of ships for pollution prevention.

This will involve adoption of routine measures and standard best practice in terms of waste management, auditing, pollution prevention measures and implementation of a dropped object protocol. Oil and fuel shall be stored securely in bunded containers. Chemicals will be stored securely, and good housekeeping practices will be adhered to always.

Through implementation of these mitigation measures there will be no route to impact for litter and pollution impacts to QIs. Therefore, it is possible to conclude no adverse effect on site integrity from the Proposed Activities alone.

Conclusion

Overall, with consideration that it has been stated above, with the implementation of mitigation measures PTS or TTS from increased anthropogenic noise, mortality or injury for collision events with vessels and litter and pollution impacts will have a negligible effect, whilst disturbance from anthropogenic noise will not result in a significant effect. It is therefore concluded that there is no potential for AESI on Rockabill to Dalkey Island SAC or its COs as a result of the Proposed Activities. Only disturbance from increased anthropogenic noise is screened in for in-combination impacts. As the other impacts have negligible potential for AESI they are not screened in for in-combination effects.

5.2.1.2 All Other Designated Sites

PTS or TTS from increased anthropogenic noise

This impact is fully considered and assessed within the above section 5.2.1.1. Rockabill to Dalkey Island SAC is closer than all other designated sites and it is therefore considered that these sites potential for AESI is the same or reduced compared to that of Rockabill to Dalkey Island SAC.

Disturbance from increased anthropogenic noise

With the exception of the SBP, UHRS and USBL, the sound emitted by the equipment will not be audible to harbour porpoise because the frequencies over which the equipment (MBES, SSS) operates will be higher than the higher frequency hearing cut-offs for each of the hearing groups.

It is possible that the SBP, UHRS and USBL may be detected by both cetaceans and seals, therefore their use may have the potential to cause a behavioural response (i.e., spatial avoidance). The Joint Nature Conservation Committee (JNCC) recommend a likely conservative effective deterrence range (EDR) of 5 km for geophysical surveys (including SBP; JNCC, 2020). As the geotechnical survey work will emit considerably lower levels of noise, it is considered that a 5 km EDR overly covers the spatial extent of any behavioural effects likely to arise.

Because the distances between all designated sites and the Licence area are greater than 5 km, no behavioural effects will occur within the SAC boundaries. In addition, any individuals affected outside the SACs have extensive alternative habitat available, with the 5 km EDR of the survey work equating to approximately less than 0.2% and 0.02% of the harbour porpoise (Celtic and Irish Seas MU) Management Units (IAMMWG, 2021).

On cessation of activities, it is considered that usage of the affected area by species will return to pre-survey levels, as has been observed following other noise emitting activities such as seismic surveys and piling events

(Thompson *et al*., 2013; Vallejo *et al*., 2017); harbour porpoise have been observed to return to areas affected by noise producing activities within as little as three to four hours following cessation (Thompson *et al*., 2013), i.e., within the same day. It is considered that usage of any affected areas will return to pre-survey levels as has been observed following seismic surveys and piling events in other areas of high quality porpoise habitat (Thompson *et al*., 2013; Vallejo *et al*., 2017). Furthermore, responses to noise are likely to diminish over time as animals become habituated to the activity (see Thompson *et al*., 2013 for seismic surveys; Graham *et al*., 2019 for pile driving). Although the characteristics of the noise emissions of the activities proposed under this MULA are similar to those considered in the above published research, i.e., pulsed sound, they are lesser in magnitude therefore it is reasonable to infer comparable or milder post-activity behaviour.

Therefore, considering the large amount of habitat available to the QI (and negligible level of effect at that scale), and high certainty that the nature of any spatial avoidance will be temporary, it is concluded that there is negligible potential for adverse effects on any COs, and no adverse effects on site integrity will arise, from the Proposed Activities alone.

Mortality or injury from collision events (with vessels)

This impact is fully considered and assessed within the above section 5.2.1.1. Rockabill to Dalkey Island SAC is closer than all other designated sites and it is therefore considered that these sites potential for AESI is the same or reduced compared to that of Rockabill to Dalkey Island SAC and therefore negligible.

Mortality or reduced health/ fitness from pollution events or littering

Both the assessment and mitigation for these sites are the same as Rockabill to Dalkey Island SAC in Section 5.2.1.1.

Conclusions

Overall, with consideration that it has been stated above that all impacts, with the implementation of mitigation measures, will have a negligible effect, it is therefore concluded that there is no potential for AESI on any of the sites or their COs as a result of the Proposed Activities. As all impacts have negligible potential for AESI they are not screened in for in-combination assessment.

5.2.2 Grey Seal and Harbour Seal

The following sites are considered for assessment of impacts on grey and harbour seal.

Irish Sites

- Lambay Island SAC
- Slaney River Valley SAC

Transboundary UK Sites

- Lleyn Peninsula and the Sarnau SAC
- Cardigan Bay SAC

All of their COs (where they exist) are included in Table 9.2 in Appendix A. Where COs have not been set for the QI, the closest designated site with relevant COs has been considered instead (specifically for the recent round of new marine mammal QIs in designation sites within Ireland).

5.2.2.1 Lambay Island SAC

PTS or TTS from increased anthropogenic noise

The sound emitted by geophysical and geotechnical survey equipment has the potential to induce the onset of PTS or TTS when the frequencies emitted by the equipment fall within the species' hearing ranges. Grey seal and harbour seal are within the phocid carnivores in water group with a hearing range of 0.05 – 86 kHz.

Geophysical survey equipment emits pulsed sound, and Southall *et al*. (2019) provide thresholds for received pulsed sound levels that have the potential to induce the onset of instantaneous PTS and TTS in grey and harbour seal which are:

PTS – 218 dB re 1 µPa

TTS – 212 dB re 1 µPa

The following typical geophysical survey equipment is proposed:

- Multibeam echosounder (MBES)
- Side Scan Sonar (SSS)
- Magnetometer(s)/gradiometer
- Sub Bottom Profiler (SBP)
- Ultra-High Resolution Seismic (UHRS)
- Ultra-Short Baseline (USBL) positioning equipment

Of these, the magnetometer/gradiometer is passive and emits no sound, so has no potential to cause any effect. All MBES and SSS utilised on the Proposed Activities will operate outside the hearing frequency threshold of all harbour porpoise (i.e., above 200 kHz) and as such have no potential to induce the onset of PTS or TTS in any QI.

The SBP and UHRS operate across a range of relatively low frequencies (e.g., 0.2 – 16 kHz) and thus overlap the range of grey and harbour seal. These pieces of equipment can also emit sound at relatively high intensities (up to and including 247 dB re 1 µPa) and as such have the potential to induce the onset of PTS and TTS in marine mammal QIs in the absence of mitigation. The USBL operates over a wide frequency range (e.g., 18- 55 kHz), with sound levels of up to 207 dB re 1 µPa. USBLs therefore do not have the potential to induce the onset of PTS and TTS in grey and harbour seal.

Geotechnical sampling techniques emit non-pulsed, i.e., continuous, sound. Southall *et al*. (2007) provide thresholds for received non-pulsed sound levels that have the potential to induce the onset of instantaneous PTS in each hearing group (no thresholds exist for non-pulsed instantaneous TTS). The threshold for PTS in grey and harbour seal is 218 dB re 1 µPa.

The following geotechnical sampling techniques are proposed:

- Borehole
- Cone penetration test (CPT) / Seismic CPT
- Vibrocore

Operating frequencies of the above sampling techniques are within the audible range of grey and harbour seal. Due to the low levels of sound predicted (124 – 194 dB re 1 µPa), no instantaneous PTS onset is predicted to arise as a result of geotechnical surveys.

There is no potential for PTS or TTS from the ADCP equipment because it's operating frequency falls outside the hearing range of cetaceans.

Mitigation

Guidance for risk mitigation of maritime sound-producing activities including geophysical acoustic surveys and drilling was issued by the Department of Arts, Heritage and the Gaeltacht (DAHG, now DTCAGSM) in 2014.

This guidance will be implemented for all geophysical and geotechnical surveys, with the following exceptions which are based on contemporary research, guidance, and analysis of the Proposed Activities:

- Mitigation will be implemented for all audible sources where there is potential for instantaneous TTS or PTS onset;
- In situations where effective visual monitoring is not possible prior to sound-producing activities, passive acoustic monitoring (PAM) will be undertaken to allow work to proceed. PAM is a well-established technique used worldwide for real-time monitoring of the presence of marine mammals during mitigation work (e.g., to negate the potential for instantaneous auditory injury during geophysical and geotechnical survey work). The use of PAM was integrated into the Joint Nature Conservation Committee (JNCC) guidelines as early as 2002 and is now a standard tool for marine mammal mitigation (and other) work. Recent documentation by the Irish Whale and Dolphin Group (IWDG; "IWDG Policy on Offshore Windfarm Development") published in 2020 proposes that PAM should be adopted into standard mitigation protocols for Irish waters;
- Due to the low level of potential risk (compared to true seismic surveys), the high directionality of the sound source and the proximity to the sound source to the seabed compared to true seismic surveys), the monitored zone for seismic equipment/techniques (UHRS, seismic borehole – sparker and airgun, if required) will be 500 m (rather than 1,000 m); and
- For the reasons outlined above, ramp up procedures (for the UHRS) will be conducted over 20 minutes (rather than 40 minutes).

In addition, all MBES and SSS utilised on the Proposed Activities will operate outside the hearing frequency thresholds of all species (i.e., above 200 kHz) and as such have no potential to induce PTS or TTS in any QI.

These actions will ensure that the potential for instantaneous PTS or TTS onset will be negligible (through ensuring adequate separation of animals from the survey equipment to ensure sufficient attenuation of sound is achieved), thereby ensuing no adverse effects on the COs, and no adverse effects on site integrity from the Proposed Activities alone.

Disturbance from increased anthropogenic noise

With the exception of the SBP, UHRS and USBL, the sound emitted by the equipment will not be audible to seals because the frequencies over which the equipment (MBES, SSS) operates will be higher than the higher frequency hearing cut-offs for their hearing group.

It is possible that the SBP, UHRS and USBL may be detected by seals, therefore their use may have the potential to cause a behavioural response (i.e., spatial avoidance). The Joint Nature Conservation Committee (JNCC) recommend a likely conservative effective deterrence range (EDR) of 5 km for other geophysical surveys (including SBP; JNCC, 2020). As the geotechnical survey work will emit considerably lower levels of noise, it is considered that a 5 km EDR overly covers the spatial extent of any behavioural effects likely to arise.

As the designated site and the Licence area are greater than 5 km from each other, no behavioural effects will occur within the SAC boundaries. In addition, any individuals affected outside the SACs have extensive alternative habitat available, with the 5 km EDR of the survey work equating to approximately 0.25% of the 100 km range of seal species (Jones *et al*., 2010; Sharples *et al*., 2012).

Responses to noise are likely to diminish over time as animals become habituated to the activity (see Thompson *et al*., 2013 for seismic surveys; Graham *et al*., 2019 for pile driving). Although the characteristics of the noise emissions of the activities proposed under this MULA are similar to those considered in the above published research, i.e., pulsed sound, they are lesser in magnitude therefore it is reasonable to infer comparable or milder post-activity behaviour.

Therefore, considering the large amount of habitat available to the QI (and negligible level of effect at that scale), and high certainty that the nature of any spatial avoidance will be temporary, it is concluded that negligible adverse effects on any COs will occur, and no adverse effects on site integrity will arise, from the Proposed Activities alone.

Mortality or injury from collision events (with vessels)

Vessel strikes are a known cause of mortality in marine mammals (Laist *et al*., 2001). Non-lethal collisions have also been documented (Laist *et al*., 2001; Van Waerebeek *et al*., 2007). Injuries from such collisions can be divided into two broad categories: blunt trauma from impact and lacerations from propellers. Injuries may result in individuals becoming vulnerable to secondary infections. Slower vessels, following a consistent trajectory, allow animals the opportunity to avoid collisions. The risk of fatality is also reduced if vessels are moving slowly.

Grey and harbour seal are considered to be more agile than the large whales and have been shown to avoid ships e.g., Palka and Hammond (2001).

Due to the nature of the Proposed Activities, the vessels will either be:

- Following a pre-defined linear route at low to moderate working speeds (geophysical survey);
- Stationary (geotechnical survey when sampling); or
- Transiting in a predictable manner (geotechnical survey when travelling between sampling locations).

Therefore, it will be easy for animals to predict their path and avoid them, which will greatly reduce the risk of collision. The risk is also reduced when vessels are slow moving (Vanderlaan and Taggart, 2007). Therefore, the potential for adverse effects resulting from collision is considered to be negligible.

In addition, it is considered that the small number of additional vessels associated with the Proposed Activities will not significantly increase the high level of vessel traffic which already uses the western Irish Sea, and therefore will not present a more significant risk of collision than animals currently experience.

Therefore, considering the negligible risk of collision which is not elevated beyond the baseline arising from the high level of vessel traffic already in the area, it is concluded that no adverse effects on any COs will occur, and no adverse effects on the site integrity will arise from the Proposed Activities alone.

Mortality or reduced health/ fitness from pollution events or littering

Both the assessment and mitigation for this site is the same as Rockabill to Dalkey Island SAC in Section 5.2.1.1.

Conclusions

Overall, with consideration that it has been stated above that all impacts, with the implementation of mitigation measures, will have a negligible effect, it is therefore concluded that there is no potential for AESI on Lambay Island SAC or its COs as a result of the Proposed Activities. As all impacts have negligible potential for AESI the impacts are screened out from the in-combination assessment.

5.2.2.2 All Other Designated Sites

All impacts

All impacts are fully considered and assessed within the above section 5.2.2.1. Lambay Island SAC is closer than all other designated sites for the same QI and it is therefore considered that these sites potential for AESI is the same or reduced compared to that of Lambay Island SAC.

Conclusions

Overall, with consideration that it has been stated above that all impacts, with the implementation of mitigation measures, will have a negligible effect, it is therefore concluded that there is no potential for AESI of the sites or their COs as a result of the Proposed Activities. As all impacts have negligible potential for AESI they are not screened in for in-combination assessment.

5.2.3 Bottlenose Dolphin

The following sites are considered for assessment of impacts on bottlenose dolphin.

Irish Sites

- Hook Head SAC

Transboundary UK Sites

- Lleyn Peninsula and the Sarnau SAC
- Cardigan Bay SAC

All of their COs are included in Table 9.2.

5.2.3.1 Lleyn Peninsula and the Sarnau SAC

PTS or TTS from increased anthropogenic noise

The sound emitted by geophysical and geotechnical survey equipment has the potential to induce the onset of PTS or TTS when the frequencies emitted by the equipment fall within the species' hearing ranges. Bottlenose dolphin are within the high frequency cetacean group with a hearing range of 0.15 – 160 kHz.

Geophysical survey equipment emits pulsed sound, and Southall *et al*. (2019) provide thresholds for received pulsed sound levels that have the potential to induce the onset of instantaneous PTS and TTS in bottlenose dolphin which are:

PTS – 230 dB re 1 µPa

TTS – 224 dB re 1 µPa

The following typical geophysical survey equipment is proposed:

- Multibeam echosounder (MBES)
- Side Scan Sonar (SSS)
- Magnetometer(s)/gradiometer
- Sub Bottom Profiler (SBP)
- Ultra-High Resolution Seismic (UHRS)

- Ultra-Short Baseline (USBL) positioning equipment

Of these, the magnetometer/gradiometer is passive and emits no sound, so has no potential to cause any effect. All MBES and SSS utilised on the Proposed Activities will operate outside the hearing frequency threshold of all bottlenose dolphin (i.e., above 200 kHz) and as such have no potential to induce the onset of PTS or TTS in any QI.

The SBP and UHRS operate across a range of relatively low frequencies (e.g., 0.2 – 16 kHz) and thus overlap the range of bottlenose dolphin These pieces of equipment can also emit sound at relatively high intensities (up to and including 247 dB re 1 µPa) and as such have the potential to induce the onset of PTS and TTS in marine mammal QIs in the absence of mitigation. The USBL operates over a wide frequency range (e.g., 18- 55 kHz), with sound levels of up to 207 dB re 1 µPa. USBLs therefore do not have the potential to induce the onset of PTS and TTS in bottlenose dolphin.

Geotechnical sampling techniques emit non-pulsed, i.e., continuous, sound. Southall *et al*. (2007) provide thresholds for received non-pulsed sound levels that have the potential to induce the onset of instantaneous PTS in each hearing group (no thresholds exist for non-pulsed instantaneous TTS). The threshold for PTS in bottlenose dolphin is 230 dB re 1 µPa.

The following geotechnical sampling techniques are proposed:

- Borehole
- Cone penetration test (CPT) / Seismic CPT
- Vibrocore

Operating frequencies of the above sampling techniques are within the audible range of bottlenose dolphin. Due to the low levels of sound predicted (124 – 194 dB re 1 µPa), no instantaneous PTS onset is predicted to arise as a result of geotechnical surveys.

There is no potential for PTS or TTS from the ADCP equipment because it's operating frequency falls outside the hearing range of cetaceans.

Mitigation

Guidance for risk mitigation of maritime sound-producing activities including geophysical acoustic surveys and drilling was issued by the Department of Arts, Heritage and the Gaeltacht (DAHG, now DTCAGSM) in 2014.

This guidance will be implemented for all geophysical and geotechnical surveys, with the following exceptions:

- Mitigation will be implemented for all audible sources where there is potential for instantaneous TTS or PTS onset;
- In situations where effective visual monitoring is not possible prior to sound-producing activities, passive acoustic monitoring (PAM) will be undertaken to allow work to proceed. PAM is a well-established technique used worldwide for real-time monitoring of the presence of marine mammals during mitigation work (e.g., to negate the potential for instantaneous auditory injury during geophysical and geotechnical survey work). The use of PAM was integrated into the Joint Nature Conservation Committee (JNCC) guidelines as early as 2002 and is now a standard tool for marine mammal mitigation (and other) work. Recent documentation by the Irish Whale and Dolphin Group (IWDG; "IWDG Policy on Offshore Windfarm Development") published in 2020 proposes that PAM should be adopted into standard mitigation protocols for Irish waters;
- Due to the low level of potential risk (compared to true seismic surveys), the high directionality of the sound source and the proximity to the sound source to the seabed compared to true seismic surveys), the monitored zone for seismic equipment/techniques (UHRS, seismic borehole – sparker and airgun, if required) will be 500 m (rather than 1,000 m); and
- For the reasons outlined above, ramp up procedures (for the UHRS) will be conducted over 20 minutes (rather than 40 minutes).

In addition, all MBES and SSS utilised on the Proposed Activities will operate outside the hearing frequency thresholds of bottlenose dolphin (i.e., above 200 kHz) and as such have no potential to induce PTS or TTS in any QI.

These actions will ensure that the potential for instantaneous PTS or TTS onset will be negligible (through ensuring adequate separation of animals from the survey equipment to ensure sufficient attenuation of sound is achieved), thereby ensuing no adverse effects on the COs, and no adverse effects on site integrity from the Proposed Activities alone.

Disturbance from increased anthropogenic noise

With the exception of the SBP, UHRS and USBL, the sound emitted by the equipment will not be audible to bottlenose dolphin because the frequencies over which the equipment (MBES, SSS) operates will be higher than the higher frequency hearing cut-offs for their hearing group.

It is possible that the SBP, UHRS and USBL may be detected by bottlenose dolphin, therefore their use may have the potential to cause a behavioural response (i.e., spatial avoidance). The Joint Nature Conservation Committee (JNCC) recommend a likely conservative effective deterrence range (EDR) of 5 km for other geophysical surveys (including SBP; JNCC, 2020). As the geotechnical survey work will emit considerably lower levels of noise, it is considered that a 5 km EDR overly covers the spatial extent of any behavioural effects likely to arise.

As the designated site and the Licence area are greater than 5 km from each other, no behavioural effects will occur within the SAC boundaries. In addition, any individuals affected outside the SACs have extensive alternative habitat available, with the 5 km EDR of the survey work equating to approximately less than 0.2% and 0.02% of the bottlenose dolphin (Irish Sea MU) (IAMMWG, 2021).

A study of bottlenose dolphin response to impulsive noise (including the piling campaigns of Beatrice offshore windfarm and Moray East offshore windfarm, northeast Scotland), suggest that these activities did not cause displacement of the species from the southern coast of the Moray Firth (Fernandez-Betelu *et al*., 2021). At the small temporal scale, dolphin detections increased, and the species remained within the predicted impacted area close to the offshore activities, for a median of two hours per day, on days with impulsive noise. Other studies in the Cromarty Firth, northeast Scotland have suggested small spatial and temporal scale disturbance of bottlenose dolphins from piling activities have occurred previously, as evidenced by a slight reduction of the presence, detection positive hours, and the encounter duration in the vicinity of construction works, although dolphins were not excluded entirely from the area (Graham *et al*., 2017a).

On cessation of activities, it is considered that usage of the affected area by species will return to pre-survey levels, as has been observed following other noise emitting activities such as seismic surveys and piling events (Thompson *et al*., 2013; Vallejo *et al*., 2017). Responses to noise if there have been any, are likely to diminish over time as animals become habituated to the activity (see Thompson *et al*., 2013 for seismic surveys; Graham *et al*., 2019 for pile driving). Although the characteristics of the noise emissions of the activities proposed under this MULA are similar to those considered in the above published research, i.e., pulsed sound, they are lesser in magnitude therefore it is reasonable to infer comparable or milder post-activity behaviour.

Therefore, considering the large amount of habitat available to the QI (and negligible level of effect at that scale), and high certainty that the nature of any spatial avoidance will be temporary, it is concluded that no adverse effects on any COs will occur, and no adverse effects on site integrity will arise, from the Proposed Activities alone.

Mortality or injury from collision events (with vessels)

Vessel strikes are a known cause of mortality in marine mammals (Laist *et al*., 2001). Non-lethal collisions have also been documented (Laist *et al*., 2001; Van Waerebeek *et al*., 2007). Injuries from such collisions can be divided into two broad categories: blunt trauma from impact and lacerations from propellers. Injuries may result

in individuals becoming vulnerable to secondary infections. Slower vessels, following a consistent trajectory, allow animals the opportunity to avoid collisions. The risk of fatality is also reduced if vessels are moving slowly.

Avoidance behaviour by bottlenose dolphin is often associated with fast, unpredictable boats such as speedboats and jet-skis (Bristow and Reeves, 2001; Gregory and Rowden, 2001; Leung and Leung, 2003; Buckstaff, 2004), while neutral or positive reactions have been observed with larger, slower moving vessels such as cargo ships (Leung and Leung, 2003; Sini *et al*., 2005). Bottlenose dolphin are considered to be more agile than the large whales and have been shown to avoid ships e.g., Palka and Hammond (2001).

Due to the nature of the Proposed Activities, the vessels will either be:

- Following a pre-defined linear route at low to moderate working speeds (geophysical survey);
- Stationary (geotechnical survey when sampling); or
- Transiting in a predictable manner (geotechnical survey when travelling between sampling locations).

Therefore, it will be easy for animals to predict their path and avoid them, which will greatly reduce the risk of collision. The risk is also reduced when vessels are slow moving (Vanderlaan and Taggart, 2007). Therefore, the potential for adverse effects resulting from collision is considered to be negligible.

In addition, it is considered that the small number of additional vessels associated with the Proposed Activities will not significantly increase the high level of vessel traffic which already uses the western Irish Sea, and therefore will not present a more significant risk of collision than animals currently experience.

Therefore, considering the negligible risk of collision which is not elevated beyond the baseline arising from the high level of vessel traffic already in the area, it is concluded that no adverse effects on any COs will occur, and no adverse effects on the site integrity will arise from the Proposed Activities alone.

Mortality or reduced health/ fitness from pollution events or littering

Both the assessment and mitigation for this site is the same as Rockabill to Dalkey Island SAC in Section 5.2.1.1.

Conclusions

Overall, with consideration that it has been stated above that all impacts, with the implementation of mitigation measures, will have a negligible effect, it is therefore concluded that there is no potential for AESI of the site or its COs as a result of the Proposed Activities. As all impacts have negligible potential for AESI they are not screened in for in-combination assessment.

5.2.3.2 All Other Designated Sites

All impacts

All impacts are fully considered and assessed within the above section 5.2.3.1. Lleyn Peninsula and the Sarnau SAC is closer than all other designated sites for the same QI and it is therefore considered that these sites potential for AESI is the same or reduced compared to that of Lleyn Peninsula and the Sarnau SAC.

Conclusions

Overall, with consideration that it has been stated above that all impacts, with the implementation of mitigation measures, will have a negligible effect, it is therefore concluded that there is no potential for AESI of these sites or theirs COs as a result of the Proposed Activities. As all impacts have negligible potential for AESI they are not screened in for in-combination assessment.

5.3 Annex I Habitats

5.3.1 Rockabill to Dalkey Island SAC

Rockabill to Dalkey Island SAC is located within and adjacent to the Licence area, with the Licence area overlapping with 9.2% (25.14 km²) of the designated site. The COs for the Reefs QI is clarified within Appendix A - Table 9.3.

5.3.1.1 Reefs

Direct physical disturbance

As the Licence area overlaps this SAC, surveys are planned to take place within the boundary of the SAC. A number of different elements of the Proposed Activities have the potential to directly disturb the reef QI. There are currently no planned surveys located within areas of reef identified within NPWS's COs (NPWS, 2013). However, direct physical disturbance may occur as a result of direct contact with the seabed in areas of reef not identified on that map, within the SAC (i.e. through benthic grabs, epibenthic beam trawl, geotechnical site investigation and baseline surveys, or deployment of metocean equipment).

Mitigation

In order to ensure no adverse effects on the CO of the SAC, mitigation will be put in place to ensure that no extractive survey methods (or placement of anchors or jack up legs) cause damage to these features. This will be achieved by using geophysical survey data to identify the locations of potential Annex I reef in order that extractive survey locations (or placement of anchors, jack up legs or metocean devices) avoid any areas of potential reef. Through implementation of these mitigation measures there will be no route to impact, and the COs of the QI will remain unaffected both alone and screen out the potential for in-combination effects.

Increased SSC/ Smothering

SSC may increase around any of the Proposed Activities that physically disturb the seabed (i.e. benthic grabs, epibenthic beam trawl, geotechnical site investigation and baseline surveys, or deployment of metocean equipment). These increases in SSC can affect filter feeding species by blocking feeding apparatus, smothering sessile species, or interfering with respiratory function, or can increase scour in areas of strong tidal movement. Regional data contained within the Integrated Mapping for the Sustainable Development of Ireland's Marine Resource (INFOMAR) Programme state that the most likely substrate types in the offshore regions of the Licence area are well sorted medium sand and coarse sediment in a patchy distribution, all of which are exposed to the strong hydrodynamic movements in the area. There is likely to be a low proportion of fine fractions within the sediment and low organic carbon content (Wheeler *et al*., 2009). Other notable habitats within the Licence area include areas of finer sediments and muds, particularly as you move towards the inshore sheltered areas (e.g., near to, and within, Dublin Bay).

Coughlan *et al*. (2021) through a detailed hydrodynamic modelling exercise of the entire Irish Sea Basin concluded that Codling Bank had one of the lowest levels of sediment mobility within the region, due to the coarse nature of the sediments in the area, despite (or perhaps because of) the strong tidal currents the area is exposed to. It was also noted that in areas of finer sediment, such as those within the nearshore areas of Dublin Bay, similarly low seabed mobility exists, principally due to the low tidal current speeds in these areas which have created areas of net sediment accretion (Coughlan *et al*., 2021). Considering this, and the small (in comparison with wider natural processes such as storm events) and very localised increases in suspended

sediment that may arise from the Proposed Activities, no elevation in SSC beyond close proximity (i.e., 1 km) of Proposed Activities that may disturb the seabed is predicted, and any disturbance will be temporary.

In addition to the limited mobility potential, any potential sediment arisings from surveys would also be small, due to the equipment and methodologies used that do not disturb large areas of seabed (< 1 m² per sample). Considering the temporary and highly localised nature of the work, and the limited magnitude and spatial scale of any effect, the habitat area, distribution, and community structure will remain unchanged, and it is therefore considered that there is no potential for adverse effects on integrity to arise as a result of an increase in SSC on reef features. However, it is considered that the slight increase in SSC may then contribute to in-combination impacts and therefore is screened in for in-combination assessment.

Community or habitat changes due to remobilisation of contaminated sediments during the Proposed Activities

Pollution by contaminated sediments can impact on the fitness or health of organisms or communities and thus alter community structure or habitats. Potential connectivity is considered to be in line with that associated with increases in SSC, however typically contaminated sediments are only associated with finer sediments as they do not bind effectively with coarse sands and gravels.

Regional data contained within the Integrated Mapping for the Sustainable Development of Ireland's Marine Resource (INFOMAR) Programme state that the substrate types in this part of the Licence area are well sorted medium sand and coarse sediment in a patchy distribution. All of which are exposed to the strong hydrodynamic movements in the area. Accordingly, this will result in a low proportion of fine fractions within the sediment and low organic carbon content (Wheeler *et al*., 2009), resulting in low potential for contaminated sediments to be present in the area for remobilisation onto the SAC features. Marine Institute data confirms this with the offshore sampling locations (i.e. Irish Sea station 9) within the Licence area studied showing concentrations of contaminants below Cefas action level 1 ((Data.gov.ie, 2007)).

As such, the negligible potential for remobilisation of contaminated sediments in the surrounding area, coupled with the low potential for remobilisation of sediments by Proposed Activities, which is smaller in magnitude than natural processes such as the effects of storms might give rise to, ensures that there is no potential for adverse effects on integrity to arise from the Proposed Activities, and therefore is screened out for potential in-combination effects.

Community or habitat changes resulting from introduction of invasive non-native species (INNS) arising from the Proposed Activities.

Introduction of non-native invasive species can alter community composition through changes in predation or competition for resource, which can lead to a change in habitat, or loss of native species. The introduction of such invasive species can be via vessel or through contaminated (i.e. colonised by invasive species) equipment. In order to remove the potential route to impact, the following mitigation will be implemented:

- All relevant project vessels will adhere to the International Convention for the Control and Management of Ships' Ballast Water and Sediments (the Ballast Water Management (BWM) Convention); and
- All relevant project vessels will adhere to the Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (Biofouling Guidelines) (resolution MEPC.207(62)).

Through implementation of these mitigation measures there will be no route to impact, and COs of the QI will remain unaffected. Therefore, it is possible to conclude no adverse effect on site integrity from the Proposed Activities alone and screen out the potential for in-combination effects.

Community or habitat changes resulting from littering or pollution events arising from the Proposed Activities.

In order to ensure no adverse effects on QIs, all vessels undertaking survey works will adhere to MARPOL requirements, which provide an international standard for the safe management and operation of ships for pollution prevention.

This will involve adoption of routine measures and standard best practice in terms of waste management, auditing, pollution prevention measures and implementation of a dropped object protocol. Oil and fuel shall be stored securely in bunded containers. Chemicals will be stored securely, and good housekeeping practices will be adhered to always.

Through implementation of these mitigation measures there will be no route to impact for litter and pollution impacts to QIs. Therefore, it is possible to conclude no adverse effects on site integrity from the Proposed Activities alone and screen out the potential for in-combination effects.

Conclusions:

Overall, with consideration that it has been stated above that all impacts aside from increased SSC and smothering, with the implementation of mitigation measures, will have a negligible effect. Increased SSC and smothering is concluded to have no potential for AESI, but has the potential to contribute to other sources of SSC. Overall, it is therefore concluded that there is no potential for AESI on Rockabill to Dalkey Island SAC or its COs as a result of the Proposed Activities. There is the potential for in-combination effects from increased SSC and smothering. The other impacts have negligible potential for AESI and they are screened out from the in-combination assessment.

5.3.2 Wicklow Reef SAC

Wicklow Reef SAC is located adjacent to the Licence area. The COs for the Reefs QI are clarified within Appendix A -Table 9.3.

5.3.2.1 Reefs

Direct Physical Disturbance

As the Licence area is adjacent to this SAC, surveys may take place alongside the boundary of the SAC. A number of different elements of the Proposed Activities have the potential to directly disturb QIs. Direct physical disturbance may occur as a result of direct contact with the seabed (i.e. through benthic grabs, epibenthic beam trawl, geotechnical site investigation and baseline surveys, or deployment of metocean equipment).

Mitigation

In order to ensure no adverse effects on the COs of the SAC, mitigation will be put in place to ensure that no extractive survey methods (or placement of anchors or jack up legs) cause damage to these features. This will be achieved by using geophysical survey data to identify the locations of potential Annex I reef in order that extractive survey locations (or placement of anchors, jack up legs or metocean devices) avoid any areas of potential reef. Through implementation of these mitigation measures there will be no route to impact, and the COs of the QI will remain unaffected alone, and therefore is not screened in for in-combination effects.

Increased SSC/Smothering

SSC may increase around any of the Proposed Activities that physically disturb the seabed (i.e. benthic grabs, epibenthic beam trawl, geotechnical site investigation and baseline surveys, or deployment of metocean equipment). These increases in SSC can affect filter feeding species by blocking feeding apparatus, smothering sessile species, or interfering with respiratory function, or can increase scour in areas of strong tidal movement. Regional data contained within the Integrated Mapping for the Sustainable Development of Ireland's Marine Resource (INFOMAR) Programme state that the most likely substrate types in the offshore regions of the Licence Area are well sorted medium sand and coarse sediment in a patchy distribution. All of which are exposed to the strong hydrodynamic movements in the area. There is likely to be a low proportion of fine fractions within the sediment and low organic carbon content (Wheeler *et al*., 2009).

Coughlan *et al*. (2021) through a detailed hydrodynamic modelling exercise of the entire Irish Sea Basin concluded that Codling Bank had one of the lowest levels of sediment mobility within the region, due to the coarse nature of the sediments in the area, despite (or perhaps because of) the strong tidal currents the area is exposed to. It was also noted that in areas of finer sediment, such as those within the nearshore areas of Dublin Bay, similarly low seabed mobility exists, principally due to the low tidal current speeds in these areas which have created areas of net sediment accretion (Coughlan *et al*., 2021). Considering this, and the small (in comparison with wider natural processes such as storm events) and very localised increases in suspended sediment that may arise from the Proposed Activities, no elevation in SSC beyond close proximity (i.e., 1 km) of Proposed Activities that may disturb the seabed is predicted. In addition to the limited mobility potential, any potential sediment arisings from surveys would also be small, due to the equipment and methodologies used that do not disturb large areas of seabed (< 1 m^2 per sample). Considering the temporary and highly localised nature of the work, and the limited magnitude and spatial scale of any effect, the habitat area, distribution, and community structure will remain unchanged, and it is therefore considered that there is no potential for adverse effects on integrity to arise as a result of an increase in SSC on reef features. However, it is considered that the slight increase in SSC may then contribute to in-combination impacts and therefore is screened in for in-combination assessment.

Community or habitat changes due to remobilisation of contaminated sediments during Proposed Activities

Pollution by contaminated sediments can impact on the fitness or health of organisms or communities and thus alter community structure or habitats. Potential connectivity is considered to be in line with that associated with increases in SSC, however typically contaminated sediments are only associated with finer sediments as they do not bind effectively with coarse sands and gravels.

Regional data contained within the Integrated Mapping for the Sustainable Development of Ireland's Marine Resource (INFOMAR) Programme state that the substrate types in this part of the Licence Area are well sorted medium sand and coarse sediment in a patchy distribution. All of which are exposed to the strong hydrodynamic movements in the area. Accordingly, this will result in a low proportion of fine fractions within the sediment and low organic carbon content (Wheeler *et al*., 2009), resulting in low potential for contaminated sediments to be present in the area for remobilisation onto the SAC features. Marine Institute data confirms this with the offshore sampling locations within the Licence Area studied showing generally low concentrations of contaminants (Data.gov.ie, 2007).

As such, the negligible potential for remobilisation of contaminated sediments in the surrounding area, coupled with the low potential for remobilisation of sediments by the proposed site investigation and baseline survey activities, ensures that there is no potential for adverse effects on integrity to arise from the Proposed Activities, and therefore is screened out of potential in-combination effects.

Community or habitat changes resulting from introduction of invasive nonnative species (INNS) arising from the Proposed Activities.

Introduction of non-native invasive species can alter community composition through changes in predation or competition for resource, which can lead to a change in habitat, or loss of native species. The introduction of such invasive species can be via vessel or through contaminated (i.e. colonised by invasive species) equipment. In order to remove the potential route to impact, the following mitigation will be implemented:

- All relevant project vessels will adhere to the International Convention for the Control and Management of Ships' Ballast Water and Sediments (the Ballast Water Management (BWM) Convention); and
- All relevant project vessels will adhere to the Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (Biofouling Guidelines) (resolution MEPC.207(62)).

Through implementation of these mitigation measures there will be no route to impact, and COs of the QI will remain unaffected. Therefore, it is possible to conclude no adverse effect on site integrity from the Proposed Activities alone and screen out the potential for in-combination effects.

Community or habitat changes resulting from littering or pollution events arising from the Proposed Activities.

In order to ensure no adverse effects on QIs, all vessels undertaking survey works will adhere to MARPOL requirements, which provide an international standard for the safe management and operation of ships for pollution prevention.

This will involve adoption of routine measures and standard best practice in terms of waste management, auditing, pollution prevention measures and implementation of a dropped object protocol. Oil and fuel shall be stored securely in bunded containers. Chemicals will be stored securely, and good housekeeping practices will be adhered to always.

Through implementation of these mitigation measures there will be no route to impact for litter and pollution impacts to QIs. Therefore, it is possible to conclude no adverse effects on site integrity from the Proposed Activities alone and screen out the potential for in-combination effects.

Conclusions

Overall, with consideration that it has been stated above that all impacts aside from increased SSC and smothering, with the implementation of mitigation measures, will have a negligible effect. Increased SSC and smothering is concluded to have no potential for AESI, but has the potential to contribute to other sources of SSC. Overall, it is therefore concluded that there is no potential for AESI on Wicklow Reef SAC or its COs as a result of the Proposed Activities. There is the potential for in-combination effects from increased SSC and smothering. The other impacts have negligible potential for AESI and they are screened out from the in-combination assessment.

5.3.3 South Dublin Bay SAC

South Dublin Bay SAC is located within and adjacent to the Licence area. The following assessment considers the following Annex I Habitats features:

- Mudflats and sandflats not covered by seawater at low tide
- Salicornia and other annuals colonising mud and sand
- Annual vegetation of drift lines
- Embryonic shifting dunes

The COs for Mudflats and sandflats not covered by seawater at low tides is presented within Appendix A -Table 9.3.

There are no COs established for the other qualifying interests of the SAC. However, the North Dublin Bay SAC is designated for the same features and is in close proximity to the South Dublin Bay SAC, therefore the other qualifying interests of the South Dublin Bay SAC will be assessed against the COs for the North Dublin Bay SAC as a proxy on a precautionary basis.

Direct Physical Disturbance

As the Licence Area overlaps this SAC, surveys may take place within the boundary of the SAC. A number of different elements of the Proposed Activities have the potential to directly disturb QIs.

Direct physical disturbance may occur as a result of direct contact with the seabed (i.e. through benthic grabs, epibenthic beam trawl, geotechnical site investigation and baseline surveys, or deployment of metocean equipment). Vessel based sampling, with deployed remote equipment, such as a grab sampler, CPT, or vibrocore, will remove or disturb small quantities of sediment (see Section 3). Offshore borehole sampling from a jack up barge may be required. This activity does have a greater footprint than the remote sampling described above, however the footprint of the jack up and associated samples is negligible in comparison with the wider habitat area and will not exceed 8 sampling stations within the SAC (per sampling campaign). A tracked vehicle may also be required to access the shore and collect geotechnical samples/excavate trial pits. Such vehicles can cause considerable surface disturbance, especially for sensitive marine habitats such as the *Zostera* dominated community, Annual vegetation of drift lines and Embryonic shifting dunes.

Sampling by vessel or by jack up barge is only going to be implemented in the more offshore areas of the SAC due to water depths, so will not affect those habitats at, or near, the upper shore, such as the *Zostera* community, Salicornia and other annuals colonising mud and sand, Annual vegetation of drift lines, or Embryonic shifting dunes.

With respect to all geotechnical or environmental sampling measures, the amount of sediment removed will be negligible in comparison with the total area of available sediment (see Section 3) and will not affect the overall sediment budget for the area, which is one of general sediment accretion (Coughlan *et al*., 2021). Any areas of Mudflat and sandflat sampled by the geotechnical or environmental sampling will recover quickly (typically within one year, though see assessment of *Anguis Tenuis* community below) through a combination of larval resettlement and, due to the small and discreet areas affected, adult mobility (Tyler Walters & Marshall, 2006).

The *Angulus tenuis* community complex is widespread within the SAC (NPWS, 2013), however, *Angulus tenuis* can be adversely affected by surface disturbance and reduced abundances are likely in heavily compacted areas though overall resilience to disturbance is considered to be high (Tillin and Ashley 2018). The majority of species present in such intertidal sedimentary habitats are pioneer species and/or those used to periods of moderate/annual disturbance and can therefore recover / recolonise disturbed sediment within a short period of time (between 6 months and 2 years (Tillin and Ashley 2018)) via larval settlement as well as adult mobility.

Mitigation

The following mitigation measures will be put in place to minimise or eliminate any potential for adverse effects on any COs:

- All work undertaken in the intertidal by tracked vehicles will avoid the *Zostera* dominated community, the Annual vegetation of drift lines, and Embryonic shifting dunes, the boundary of which will be mapped through a survey of the area prior to such work commencing;
- Movement of tracked vehicles in the intertidal area will be restricted to the minimum number of access tracks necessary to achieve the sampling. This will reduce areas of compaction, allowing rapid recovery of the small area affected after the cessation of the work, ensuring the natural condition of the feature is maintained;

- Proposed Activities on the intertidal area using a tracked vehicle will be overseen by an Ecological Clerk of Works, to ensure adherence to the above measures; and
- Any trial pits excavated will be reinstated as soon as practical to do so, allowing community recovery as soon as possible.

With the proposed mitigation measures, no pathway remains for effects on the *Zostera* dominated community, Annual vegetation of drift lines and Embryonic shifting dunes QIs, and negligible residual adverse effects remain in relation to the Mudflats and sandflats not covered by seawater at low tide QI. No adverse effects on the COs for the site will arise as a result of this residual negligible effect. There will therefore be no adverse effects upon site integrity associated with the Proposed Activities alone, and no potential for in-combination effects which are therefore screened out.

Increases in SSC

SSC may increase around any of the Proposed Activities that physically disturb the seabed (i.e. benthic grabs, epibenthic beam trawl, geotechnical site investigation surveys, or deployment of metocean equipment). These increases in SSC can affect filter feeding species by blocking feeding apparatus, smothering sessile species, or interfering with respiratory function, or can increase scour in areas of strong tidal movement.

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

The marine QIs of South Dublin Bay SAC are habitats that have formed within this area of net accretion and are thus tolerant of increases in and deposition of suspended sediments. Furthermore, the levels of sediment arising from the Proposed Activities will be low in relation to the natural background.

Mudflats and sandflats not covered by seawater at low tide experience regular remobilisation and settlement of sediments over a tidal cycle and are highly tolerant of increases in levels of SSC and associated deposition (Tyler Walters & Marshal, 2006). Salicornia and other annuals colonising mud and sand exist in areas of net accretion and are thus tolerant to of this effect, although prolonged periods of increases in SSC (exceeding one month) can lead to reduced growth (Tyler Walters, 2001). As the interaction of the survey equipment with the seabed which could lead to increases in SSC (within the SAC) are considerably shorter in duration than this, and as they will not affect the overall sediment processes in the region, negligible adverse effects on the QI as a result of increased SSC are predicted (Tyle Walters, 2001).

No pathway between increases in SSC and the QIs located above the high-water mark exist, as such no effects of increases in SSC on embryonic shifting dunes or annual vegetation of drift lines are possible.

No adverse effects on the COs for the site will arise as a result of this effect. There will therefore be no adverse impacts upon site integrity associated with the Proposed Activities, and potential for in-combination effects can be screened out.

Community or habitat changes due to remobilisation of contaminated sediments during Proposed Activities

Pollution by contaminated sediments can impact on the fitness or health of organisms or communities and thus alter community structure or habitats. Potential connectivity is considered to be in line with that associated with increases in SSC, however typically contaminated sediments are only associated with finer sediments as they do not bind effectively with coarse sands and gravels.

Published marine sediment contaminant data in the area indicates a general low background level of contamination in line with that to be expected around heavily industrialised areas, with no patterns of consistently high levels of contaminants recorded spatially or temporally (data.gov.ie, 2007).

Coughlan *et al*. (2021), through a detailed hydrodynamic modelling exercise of the entire Irish Sea Basin concluded that in these sheltered areas of finer sediment low seabed mobility exists, principally due to the low tidal current speeds, which have created areas of net sediment accretion. As such, any remobilisation of sediments is not predicted to travel far from the point of origin, and thus any habitats or species present are considered to be tolerant to any exposure and no adverse effect on any QI are predicted from any remobilisation of contaminated sediments.

No pathway between remobilisation of contaminated sediments and the QIs located above the high-water mark exist, as such no effects of increases in SSC on embryonic shifting dunes or annual vegetation of drift lines are possible.

No adverse effects on the COs for the site will arise as a result of this effect. There will therefore be no adverse effects upon site integrity associated with the Proposed Activities, and potential for in-combination effects is therefore screened out.

Community or habitat changes resulting from introduction of invasive nonnative species (INNS) arising from the Proposed Activities.

Introduction of non-native invasive species can alter community composition through changes in predation or competition for resource, which can lead to a change in habitat, or loss of native species. The introduction of such invasive species can be via vessel or through contaminated (i.e. colonised by invasive species) equipment. In order to remove the potential route to impact, the following mitigation will be implemented:

- All relevant project vessels will adhere to the International Convention for the Control and Management of Ships' Ballast Water and Sediments (the Ballast Water Management (BWM) Convention); and
- All relevant project vessels will adhere to the Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (Biofouling Guidelines) (resolution MEPC.207(62)).

Through implementation of these mitigation measures there will be no route to impact, and COs of the QI will remain unaffected. Therefore, it is possible to conclude no adverse effect on site integrity from the Proposed Activities alone and screen out the potential for in-combination effects.

Community or habitat changes resulting from littering or pollution events arising from the Proposed Activities.

In order to ensure no adverse effects on QIs, all vessels undertaking survey works will adhere to MARPOL requirements, which provide an international standard for the safe management and operation of ships for pollution prevention.

This will involve adoption of routine measures and standard best practice in terms of waste management, auditing, pollution prevention measures and implementation of a dropped object protocol. Oil and fuel shall be stored securely in bunded containers. Chemicals will be stored securely, and good housekeeping practices will be adhered to always.

Through implementation of these mitigation measures there will be no route to impact for litter and pollution impacts to QIs. Therefore, it is possible to conclude no adverse effects on site integrity from the Proposed Activities alone and screen out the potential for in-combination effects.

Conclusions:

Overall, with consideration that it has been stated above that all impacts, with the implementation of mitigation measures, will have a negligible effect, it is therefore concluded that there is no potential for

AESI on South Dublin Bay SAC or its COs as a result of the Proposed Activities. All impacts have negligible potential for AESI and they are therefore screened out from the in-combination assessment.

6 STAGE 2 APPROPRIATE ASSESSMENT IN-COMBINATION

The following sections detail in brief plans and/or projects that are considered to have potential to contribute to in-combination impacts with this project. These projects and plans comprise of projects that have already had relevant licences issued, and projects with the potential to have licences issued and impacts occur at the same time as the Proposed activities associated with this licence application. Within Section 5 Marine Ornithology and Diadromous Fish QIs were screened out from the in-combination assessment on the basis that all alone impacts were concluded to be negligible.

6.1 Marine Ornithology

It was concluded within Section 5.1 within the assessment alone, that there is negligible risk for AESI from the Proposed Activities. Therefore, there is no potential for in-combination effects as this project does not contribute to any effects already occurring, planned for the future or being considered.

6.2 Marine Mammals

It was concluded within Section 5.1 within the assessment alone, that only Disturbance by anthropogenic noise has the potential for in-combination impact on the Harbour porpoise QI of Rockabill to Dalkey Island SAC. All other QIs, designated sites and impacts have been screened out of the in-combination due to negligible potential for AESI alone.

6.2.1 Rockabill to Dalkey Island

6.2.1.1 Harbour porpoise

Disturbance by anthropogenic noise

The following projects are considered to have potential to lead to in combination effects based on a EDR of 26 km from underwater noise from piling, or 5 km from underwater noise from surveys (JNCC, 2020):

- Dublin Port Development (6 km)
- Dublin port maintenance dredging (Adjacent/within)
- Wicklow Port Maintenance and dredging (Adjacent/Within)
- Dun Laoghaire Harbour Company (2.3 km)
- ESB Wind Development Limited (Adjacent/within)
- Greater Dublin Drainage Outfall (Adjacent/within)
- Greystones (OWL) Windfarm (11.2 km)
- Innogy – Site investigation – Dublin Array at Kish and Bray Banks (4.9 km)
- MaresConnect Electricity Interconnector Site Investigation (10.3 km)
- Microsoft Ireland Cable Area (Adjacent/within)
- Carrickmines to Poolbeg Project (Adjacent/within)
- Pembroke Beach DAC (8.2 km)
- Rockabill Cable Systems Ltd (2.6 km)
- Statkraft North Irish Sea Array (NISA) Site investigations for Export Cable Route (9.5 km)
- Techworks Marine Monitoring Buoys (1.7 km)

Due to the location of the projects considered to have potential to contribute to in-combination effects there is potential for activities under multiple projects and plans to temporarily affect harbour porpoise behaviour and presence within this SAC should the activities occur within similar timeframes. However, as discussed above in the alone assessment, any behavioural response including spatial avoidance will be temporary with harbour porpoise likely to return to affected areas within three to four hours following cessation of activity (Thompson *et al*., 2013). This would be applicable to all activities from the projects listed above. Furthermore, the SAC represents only a very small part of the over half a million square kilometres that make up the Celtic and Irish Seas MU. The effect of any behavioural response is therefore considered to be minimal and not significant due to the small proportion of available habitat affected and the temporary nature of the effects on a mobile feature that has demonstrated resilience to these kinds of impacts.

Conclusion

Overall, with consideration of the nature of impacts, it is concluded there will be minimal effect on the sites features. It is therefore concluded that there will not be an AESI on Rockabill to Dalkey Island SAC or its COs as a result of the Proposed Activities in-combination with other projects or plans in relation to Marine Mammals.

6.3 Annex I Habitats

6.3.1 Rockabill to Dalkey Island SAC

6.3.1.1 Increased SSC/Smothering

The following projects are considered to have potential to lead to effects which may overlap spatially and temporally with effects on the Rockabill to Dalkey Island SAC resulting from the Proposed Activities alone.

- Dublin Port Development (6 km)
- Dublin port maintenance dredging (Adjacent/within)
- Dun Laoghaire Harbour Company (2.3 km)
- ESB Wind Development Limited (Adjacent/within)
- Greater Dublin Drainage Outfall (Adjacent/within)
- Greystones (OWL) Windfarm (11.2 km)
- Innogy – Site investigation – Dublin Array at Kish and Bray Banks (4.9 km)
- MaresConnect Electricity Interconnector Site Investigation (10.3 km)
- Microsoft Ireland Cable Area (Adjacent/within)
- Pembroke Beach DAC (8.2 km)
- Rockabill Cable Systems Ltd (2.6 km)
- Statkraft North Irish Sea Array (NISA) Site investigations for Export Cable Route (9.5 km)
- Techworks Marine Monitoring Buoys (1.7 km)

These projects have the potential to lead to increases in SSC in the vicinity of the SAC, due to their potential interaction with the seabed in this area. However, any potential SSC arising from the site investigation work would also be small due to the equipment and methodologies used. Furthermore, regional data (https://www.infomar.ie/) states the sediment in the area to be coarse gravels, shell materials and sands (with limited fines), exposed regularly to strong hydrodynamic movements. As such, no elevation in SSC beyond close proximity of the works from any of the above projects is predicted, as any such sediment mobilised by the work will settle almost immediately. In addition, most Application Areas do not overlap and as such there will be considerable separation between any Proposed Activities. Where Application Areas do overlap, any survey

activity would be required to implement safety zones around each vessel (minimum 500 m) which will further minimise potential for in-combination effects with other projects.

Therefore, considering the temporary and highly localised nature of the work, and the limited magnitude and spatial scale of the effect, and negligible potential for spatial overlap of any arisings, the habitat area, distribution, and community structure of the Reef QI will not be adversely affected. Therefore, it is possible to conclude no in-combination adverse effect on site integrity from the Proposed Activities.

Conclusion

Overall, with consideration of the nature of impacts, it is concluded there will be minimal effect on the sites features. It is therefore concluded that there will not be an AESI on Rockabill to Dalkey Island SAC or its COs as a result of the Proposed Activities in-combination with other projects or plans in relation to Annex 1 Habitats.

6.3.2 Wicklow Reef SAC

6.3.2.1 Increased SSC/Smothering

The following projects are considered to have potential to lead to effects which may overlap spatially and temporally with effects on the Wicklow Reef SAC resulting from the Proposed Activities alone.

- Arklow Bank Wind Park (19.2 km);
- Realt na Mara Offshore Wind Farm Limited (7 km);
- Wicklow Port Dredging (3 km); and
- Wicklow Sea Wind (6.3 km).

These projects all have the potential to lead to increases in SSC in the vicinity of the SAC, due to their potential interaction with the seabed in this area. However, any potential SSC arising from the site investigation work would also be small due to the equipment and methodologies used. Furthermore, regional data (https://www.infomar.ie/) states the sediment in the area to be coarse gravels, shell materials and sands (with limited fines), exposed regularly to strong hydrodynamic movements. As such, no elevation in SSC beyond close proximity of the works from any of the above projects is predicted, as any such sediment mobilised by the work will settle almost immediately.

In addition, most Project Areas do not overlap and as such there will be considerable separation between any Proposed Activities, and where Project Areas do overlap, any vessel activity would be required to implement safety zones around each vessel (minimum 500 m) which will further minimise potential for in-combination effects with other projects. Therefore, considering the temporary and highly localised nature of the work, and the limited magnitude and spatial scale of the effect, and negligible potential for spatial overlap of any arisings, the habitat area, distribution, and community structure of the Reef QI will not be adversely affected. Therefore, it is possible to conclude no in-combination adverse effect on site integrity from the Proposed Activities.

Conclusion

Overall, with consideration of the nature of impacts, it is concluded there will be minimal effect on the sites features. It is therefore concluded that there will not be an AESI on Wicklow Reef SAC or its COs as a result of the Proposed Activities in-combination with other projects or plans in relation to Annex 1 Habitats.

7 SUMMARY OF NIS

The purpose of this document, which will accompany a Maritime Usage Licence Application, is to inform the Stage 2 AA process in determining whether the Proposed activities would adversely affect the integrity of any Natura 2000 site either alone or in-combination with other plans or projects. With consideration of the conclusions made within Sections 5 and 6, it has been concluded that overall, none of the Proposed Activities will result in a AESI either alone or in-combination for the QIs and COs of the following designated sites considered:

For Marine Ornithology

- South Dublin Bay and River Tolka Estuary SPA;
- Dalkey Islands SPA;
- The Murrough SPA;
- North-West Irish Sea cSPA;
- Wicklow Head SPA;
- North Bull Island SPA;
- Howth Head Coast SPA;
- Baldoyle Bay SPA;
- Ireland's Eye SPA;
- Wicklow Mountains SPA; and
- Malahide Estuary SPA.
- Lambay Island SPA
- Rockabill SPA
- River Nanny Estuary and Shore SPA
- Skerries Islands SPA
- Seas off Wexford SPA
- Dundalk Bay SPA
- Wexford Harbour and Slobs SPA

For Marine Mammals species

- Rockabill to Dalkey Island SAC
- Codling Fault Zone SAC
- Lambay Island SAC
- Blackwater Bank SAC
- Carnsore Point SAC
- Hook Head SAC
- North Anglesey Marine SAC
- West Wales Marine SAC
- North Channel SAC
- Bristol Channel Approaches SAC
- Lleyn Peninsula and the Sarnau SAC
- Cardigan Bay SAC

For Annex I Habitats

- Rockabill to Dalkey Island SAC
- Wicklow Reef SAC
- South Dublin Bay SAC

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9 APPENDIX A – CONSERVATION OBJECTIVES AND CONSERVATION STATUS OF ALL SITES CONSIDERED WITHIN THE STAGE 2 AA

Appendix A.1 Conservation Objectives for Marine Ornithology Features

Table 9.1: Designated Sites, their Marine Ornithology QIs and Conservation Objectives Screened in for Stage 2 AA

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
South Dublin Bay and River Tolka Estuary SPA [IE004024]	**Conservation Objectives**: To maintain the favourable conservation condition of designated bird species in South Dublin Bay and River Tolka Estuary SPA.			
	Grey Plover	Grey Plover is proposed for removal from the list of Special Conservation Interests for South Dublin Bay and River Tolka Estuary SPA. As a result, the site specific conservation objectives have not been set for this QI. The COs for the other waders on this site have been used as a proxy for Grey Plover.		
	Light-bellied Brent Goose Oystercatcher Ringed plover Knot Sanderling Dunlin Bar-tailed godwit Redshank Black-headed gull	Population Trend; Distribution	Percentage change; Range, timing and intensity of use of areas	Long term population trend stable or increasing; No significant decrease in the range, timing or intensity of use of areas by this QI, other than that occurring from natural patterns of variation.

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
	Roseate tern	Passage population: Individuals	Number	No significant decline
		Distribution: Roosting areas	Number; location; area (hectares)	No significant decline
		Prey biomass available	Kilogrammes	No significant decline
		Barriers to connectivity	Number; location; shape; area (hectares)	No significant increase
		Disturbance at roosting site	Level of impact	Human activities should occur at levels that do not adversely affect the numbers of roseate tern among the post-breeding aggregation of terns
	Common tern	Breeding population abundance: apparently occupied nests (AONs);	Number	No significant decline
		Productivity rate: Fledged young per breeding pair	Mean number	No significant decline
		Passage population: Individuals	Number	No significant decline
		Distribution: Breeding colonies	Number; location; area (Hectares)	No significant decline

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
		Distribution: Roosting areas;	Number; location; area (Hectares)	No significant decline
		Prey biomass available	No significant increase	No significant decline
		Barriers to connectivity	No significant decline	No significant increase
		Disturbance at breeding site	Level of impact	Human activities should occur at levels that do not adversely affect the breeding common tern population
		Disturbance at roosting site	Level of impact	Human activities should occur at levels that do not adversely affect the numbers of common tern among the post-breeding aggregation of terns
	Arctic tern	Passage population	Number of individuals	No significant decline
		Distribution: roosting areas	Number; location; area (hectares)	No significant decline
		Prey biomass available	Kilogrammes	No significant decline

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
		Barriers to connectivity	Number; location; shape; area (hectares)	No significant increase
		Disturbance at roosting site	Level of impact	Human activities should occur at levels that do not adversely affect the numbers of Arctic tern among the post-breeding aggregation of terns
	Wetlands and Waterbirds	Habitat Area	Hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 2,192 hectares, other than that occurring from natural patterns of variation.
The Murrough	**Conservation Objectives:** To restore or maintain the favourable conservation condition of designated bird species in The Murrough SPA			

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
SPA [IE004186]	Red-throated diver	Non-breeding population size; Spatial distribution; Disturbance across the site; Barriers to connectivity and site use; Forage spatial distribution, extent and abundance; Roost spatial distribution and extent	Number; Hectares, time and intensity of use; Intensity, frequency, timing and duration; Number, location, shape and hectares; Location, hectares and forage biomass; Location and hectares of roosting habitat;	Long term SPA population trend is stable or increasing; Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target; Disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution; Barriers do not significantly impact the site population's access to the SPA or other ecologically important sites outside the SPA; Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target; Sufficient number of locations, area and availability of suitable roosting habitat to support the population target

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
	Little tern	Breeding population size; Productivity rate; Distribution: extent of available nesting options within the SPA; Forage, spatial distribution, extent, abundance and availability; Disturbance at the breeding site; Disturbance at areas ecologically connected to the colony; Barriers to connectivity	Numbers of Apparently Occupied Nests (AON); Number of fledged young per AON; Numbers and spatial distribution; Location and hectares and forage biomass; Intensity, frequency timing and duration; Intensity, frequency timing and duration; Number, location, shape, area (hectares)	Long term SPA population is stable or increasing; Sufficient availability of suitable nesting sites throughout the SPA to maintain a stable or increasing population; Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target; Disturbance occurs at levels that do not significantly impact on birds at the breeding site; Disturbance occurs at levels that do not significantly impact on breeding population; No significant increase

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
	Greylag goose Light-bellied Brent Goose Widgeon Teal Black-headed gull Herring gull	Winter population trend; Winter spatial distribution; Disturbance at wintering site; Barriers to connectivity and site use; Forage spatial distribution, extent and abundance; Roost spatial distribution and extent; Supporting habitat: area and quality	Percentage change in number of individuals; Hectares, time and intensity of use; Intensity, frequency, timing and duration; Number, location, shape and hectares; Location, hectares and forage biomass; Location and hectares of roosting habitat; Hectares and quality	Long term winter population trend is stable or increasing; Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target; Disturbance occurs at levels that do not significantly impact the achievement of targets for population trend and spatial distribution; Barriers do not significantly impact the wintering population's access to the SPA or other ecologically important sites outside the SPA; Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target; Sufficient number of locations, area and availability of suitable roosting habitat to support the population target; Sufficient area of utilisable habitat available in ecologically important sites outside the SPA
	Conservation Objectives: To restore the favourable conservation condition of designated bird species in Dalkey Islands SPA			

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
Dalkey Islands SPA [IE004172]	Roseate tern Common tern Arctic tern	Post-breeding and passage population size; Distribution: extent of available roosting options within the SPA; Forage spatial distribution, extent, abundance and availability; Disturbance at roosting site; Disturbance at areas ecologically connected to the roost sites; Barriers to connectivity	Number of individuals at roost; Numbers and spatial distribution; Location and hectares and forage biomass; Intensity, frequency, timing and duration; Intensity, frequency, timing and duration; Number, location, shape, area (hectares)	Long term SPA population trend is stable or increasing; Sufficient availability of suitable roosting resources within the SPA to maintain a stable or increasing population; Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target; Disturbance occurs at levels that do not significantly impact on birds at the roost sites; Disturbance occurs at levels that do not significantly impact on the post-breeding and passage population; Barriers do not significantly impact the population's access to the SPA or other ecologically important sites outside the SPA
North-West Irish Sea SPA	**Conservation Objectives:** To restore or maintain the favourable conservation condition of designated bird species in North-West Irish Sea SPA			

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
[IE004236]	Red-throated diver Great Northern Diver Little gull	Non-breeding population size; Spatial distribution; Forage spatial distribution, extent and abundance; Disturbance across the site; Barriers to connectivity and site use	Number; Hectares, time and intensity of use; Location and hectares, and forage biomass; Intensity, frequency, timing and duration; Number; location; shape; area (hectares)	No significant decline; Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population; Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target; The intensity, frequency, timing and duration of disturbance occurs at levels that do not significantly impact the achievement of targets for population size and spatial distribution; The number, location, shape and area of barriers do not significantly impact the site population's access to the SPA or other ecologically important sites outside the SPA
	Fulmar Herring gull Kittiwake	Population size; Spatial distribution; Forage spatial distribution, extent, abundance and availability; Disturbance across the site; Barriers to connectivity	Number; Hectares, time and intensity of use; Location and hectares, and forage biomass; Intensity, frequency, timing and duration; Number; location; shape; area (hectares)	Long term SPA population trend is stable or increasing; Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population; Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target; The intensity, frequency, timing and duration of disturbance occurs at levels that do not significantly impact the achievement of targets for population size and spatial distribution; The number, location, shape and area of barriers do not significantly impact the site population's access to the SPA or other ecologically important sites outside the SPA

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
	Manx Shearwater Lesser black-backed gull Little tern Roseate tern Common tern Arctic tern	Breeding population size; Spatial distribution; Forage spatial distribution, extent, abundance and availability; Disturbance across the site; Barriers to connectivity	Number; Hectares, time and intensity of use; Location and hectares, and forage biomass; Intensity, frequency, timing and duration; Number; location; shape; area (hectares)	No significant decline; Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population; Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target; The intensity, frequency, timing and duration of disturbance occurs at levels that do not significantly impact the achievement of targets for population size and spatial distribution; The number, location, shape and area of barriers do not significantly impact the site population's access to the SPA or other ecologically important sites outside the SPA
	Cormorant Shag Puffin	Breeding population size; Spatial distribution; Forage spatial distribution, extent, abundance and availability; Disturbance across the site; Barriers to connectivity	Number; Hectares, time and intensity of use; Location and hectares, and forage biomass; Intensity, frequency, timing and duration; Number; location; shape; area (hectares)	Long term population trend within the SPA is stable or increasing; Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population; Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target; The intensity, frequency, timing and duration of disturbance occurs at levels that do not significantly impact the achievement of targets for population size and spatial distribution; The number, location, shape and area of barriers do not significantly impact the site population's access to the SPA or other ecologically important sites outside the SPA

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
	Common Scoter Black-headed gull Common gull Great black-backed gull	Non-breeding population size; Spatial distribution; Forage spatial distribution, extent and abundance; Disturbance across the site; Barriers to connectivity and site use	Number; Hectares, time and intensity of use; Location and hectares, and forage biomass; Intensity, frequency, timing and duration; Number; location; shape; area (hectares)	No significant decline; Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population; Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target; The intensity, frequency, timing and duration of disturbance occurs at levels that do not significantly impact the achievement of targets for population size and spatial distribution; The number, location, shape and area of barriers do not significantly impact the site population's access to the SPA or other ecologically important sites outside the SPA
	Guillemot Razorbill	Population size; Spatial distribution; Forage spatial distribution, extent, abundance and availability; Disturbance across the site; Barriers to connectivity	Number; Hectares, time and intensity of use; Location and hectares, and forage biomass; Intensity, frequency, timing and duration; Number; location; shape; area (hectares)	No significant decline; Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population; Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target; The intensity, frequency, timing and duration of disturbance occurs at levels that do not significantly impact the achievement of targets for population size and spatial distribution; The number, location, shape and area of barriers do not significantly impact the site population's access to the SPA or other ecologically important sites outside the SPA

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
North Bull Island SPA [IE004006]	**Conservation Objectives:** To maintain the favourable conservation of designated bird species in North Bull Island SPA			
	Light-bellied brent goose Shelduck Teal Pintail Shoveler Oystercatcher Golden plover Grey plover Knot Sanderling Dunlin Black-tailed godwit Bar-tailed godwit Curlew Redshank Ruddy turnstone Black-headed gull	Population trend; Distribution	Percentage change; Range, timing and intensity of use of areas	Long term population trend stable or increasing; No significant decrease in the range, timing or intensity of use of areas by the species other than that occurring from natural patterns of variation
	Conservation Objectives: To restore the favourable conservation condition of designated bird species in Wicklow Head SPA.			

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
Wicklow Head SPA [IE004127]	Kittiwake	Breeding population size; Productivity rate; Distribution: extent of available nesting options within the SPA; Forage, spatial distribution, extent, abundance and availability; Disturbance at the breeding site; Disturbance at areas ecologically connected to the colony; Barriers to connectivity	Number of AON; Number of fledged young per breeding pair; Number and spatial distribution; Location and hectares, and forage biomass; Intensity, frequency, timing and duration; Intensity, frequency, timing and duration; Number; location; shape; are (hectares)	Long term SPA population trend is stable or increasing; Sufficient to maintain a stable or increasing population; Sufficient availability of suitable nesting sites throughout the SPA to maintain a stable or increasing population; Sufficient number of locations, area of suitable habitat and available forage biomass to support population target; Disturbance occurs at levels that do not significantly impact on birds at the breeding site; Disturbance occurs at levels that do not significantly impact on breeding population; Barriers do not significantly impact the population's access to the SPA or other ecologically important sites outside the SPA
Howth Head Coast	**Conservation Objectives:** To restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA:			

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
[IE004113]	Kittiwake	Breeding population size; Productivity rate; Distribution: extent of available nesting options within the SPA; Forage, spatial distribution, extent, abundance and availability; Disturbance at the breeding site; Disturbance at areas ecologically connected to the colony; Barriers to connectivity	Number of AON; Number of fledged young per breeding pair; Number and spatial distribution; Location and hectares, and forage biomass; Intensity, frequency, timing and duration; Intensity, frequency, timing and duration; Number; location; shape; area (hectares)	Long term SPA population trend is stable or increasing; Sufficient to maintain a stable or increasing population; Sufficient availability of suitable nesting sites throughout the SPA to maintain a stable or increasing population; Sufficient number of locations, area of suitable habitat and available forage biomass to support population target; Disturbance occurs at levels that do not significantly impact on birds at the breeding site; Disturbance occurs at levels that do not significantly impact on breeding population; Barriers do not significantly impact the population's access to the SPA or other ecologically important sites outside the SPA
Ireland's Eye SPA	**Conservation Objectives:** To restore or maintain the favourable conservation condition of designated bird species in Ireland's Eye SPA			

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
[IE004117]	Guillemot Razorbill	Breeding population size; Productivity rate; Distribution: extent of available nesting options within the SPA; Forage spatial distribution, extent, abundance and availability; Disturbance at the breeding site; Disturbance at areas ecologically connected to the colony; Barriers to connectivity	Individuals (IND); Number of fledged young per breeding pair; Numbers and spatial distribution; Location and hectares, and forage biomass; Intensity, frequency, timing and duration; Intensity, frequency, timing and duration; Number; location; shape; area (hectares)	Long term SPA population trend is stable or increasing; Sufficient to maintain a stable or increasing population; Sufficient availability of suitable nesting sites throughout the SPA to maintain a stable or increasing population; Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target; Disturbance occurs at levels that do not significantly impact on birds at the breeding site; Disturbance occurs at levels that do not significantly impact on breeding population; Barriers do not significantly impact the population's access to the SPA or other ecologically important sites outside the SPA

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
	Herring gull Kittiwake Cormorant	Breeding population size; Productivity rate; Distribution: extent of available nesting options within the SPA; Forage spatial distribution, extent, abundance and availability; Disturbance at the breeding site; Disturbance at areas ecologically connected to the colony; Barriers to connectivity	Number of AON; Number of fledged young per breeding pair; Numbers and spatial distribution; Location and hectares, and forage biomass; Intensity, frequency, timing and duration; Intensity, frequency, timing and duration; Number; location; shape; area (hectares)	Long term SPA population trend is stable or increasing; Sufficient to maintain a stable or increasing population; Sufficient availability of suitable nesting sites throughout the SPA to maintain a stable or increasing population; Sufficient number of locations, area of suitable habitat and available forage biomass to support the population target; Disturbance occurs at levels that do not significantly impact on birds at the breeding site; Disturbance occurs at levels that do not significantly impact on breeding population; Barriers do not significantly impact the population's access to the SPA or other ecologically important sites outside the SPA
Baldoyle Bay SPA [IE004016]	**Conservation Objectives:** To maintain the favourable conservation condition of designated bird species in Baldoyle Bay SPA.			
	Light-bellied Brent goose Shelduck Ringed plover Golden plover Grey plover Bar-tailed godwit	Population trend; Distribution	Percentage change; Range, timing and intensity of use of areas	Long term population trend stable or increasing; No significant decrease in the range, timing and intensity of use of areas by the species, other than that occurring from natural patterns of variation
	Conservation Objectives: To maintain the favourable conservation condition of designated bird species in Wicklow Mountains SPA.			

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
Wicklow Mountains SPA [IE004040]	Merlin	Population size; Productivity rate; Distribution: extent of available nesting options within the SPA; Extent and condition of suitable open habitats for foraging; Disturbance at breeding sites	Number of occupied territories; Number of fledged young per breeding attempt with known outcome; Numbers and spatial distribution; Hectares; condition assessment; prey biomass; Intensity, frequency, timing and duration	Breeding population is increasing/stable; Sufficient to meet the population size target; Sufficient availability of suitable nesting sites throughout the SPA to maintain the population; Sufficient availability of suitable foraging habitat across the SPA to support targets relating to population size, productivity rate and distribution; Disturbance occurs at levels that do not significantly impact upon the breeding population
	Peregrine	Population size; Productivity rate; Distribution: extent of available nesting options within the SPA; Forage spatial distribution, extent, abundance and availability; Disturbance at breeding sites	Number of occupies territories; Number of fledged young per territorial pair; Numbers and distribution of occupied territories across site;	Breeding population is stable/increasing; Sufficient to maintain the population size target; Sufficient availability of suitable nesting sites throughout the SPA to maintain the population; Sufficient number of locations, area of suitable habitat, and available prey biomass (i.e. small-medium sized birds, mammals) to support the population target; Disturbance occurs at levels that does not significantly impact upon breeding population
Malahide Estuary SPA	**Conservation Objectives:** To maintain the favourable conservation condition of designated bird species in Malahide Estuary SPA.			

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
[IE004025]	Great crested grebe Light-bellied Brent goose Shelduck Pintail Goldeneye Red-breasted merganser Oystercatcher Golden plover Grey plover Knot Dunlin Black-tailed godwit Bar-tailed godwit Redshank	Population trend; Distribution	Percentage change; Range, timing and intensity of use of areas	Long term population trend stable or increasing; No significant decrease in the range, timing and intensity of use of areas by the species, other than that occurring from natural patterns of variation

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
Lambay Island SPA [IE004069]	Fulmar; Kittiwake	Breeding population size; Productivity Rate; Distribution (nesting options within the SPA); Forage spatial distribution, extent, abundance and availability; Disturbance at the breeding site; Disturbance at areas ecologically connected to the colony; Barriers to connectivity.	Apparently occupied sites; Number of fledged young per breeding pair; Numbers and spatial distribution; Location, hectares and forage biomass; Intensity, frequency, timing and duration; Intensity, frequency, timing and duration; Number, location, shape and area (hectares).	Long term SPA population trend is stable or increasing; Sufficient to maintain a stable or increasing population; Sufficient availability of suitable nesting sites throughout the SPA to maintain a stable or increasing population; Sufficient number of locations, area of suitable habitat and available forage biomass to support population target; Disturbance occurs at levels that do not significantly impact on birds at the breeding site; Disturbance occurs at levels that do not significantly impact breeding population; Barriers do not significantly impact the populations access to the SPA or other ecologically important sites outside of the SPA.

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
	Herring gull	Breeding population size; Productivity Rate; Winter population trend; Distribution (nesting options within the SPA); Winter spatial distribution; Forage spatial distribution, extent, abundance and availability (winter and breeding); Disturbance at breeding or wintering sites; Disturbance at areas ecologically connected to the colony; Winter roost spatial distribution and extent; Supporting winter habitat: area and quality; Barriers to connectivity (wintering and breeding).	Apparently occupied sites; Number of fledged young per breeding pair; Percentage change in number of individuals; Numbers and spatial distribution; Hectares, time and intensity of use; Location, hectares and forage biomass; Intensity, frequency, timing and duration; Intensity, frequency, timing and duration; Location and hectares of roosting habitat; Area (hectares) and quality; Number, location, shape and area (hectares).	Long term SPA population trend is stable or increasing; Sufficient to maintain a stable or increasing population; Long term winter population trend is stable or increasing; Sufficient availability of suitable nesting sites throughout the SPA to maintain a stable or increasing population; Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target; Sufficient number of locations, area of suitable habitat and available forage biomass to support population target; Disturbance occurs at levels that do not significantly impact on birds at the breeding or wintering sites; Disturbance occurs at levels that do not significantly impact breeding population; Sufficient number of locations, area and availability of suitable roosting habitat to support the population target; Sufficient area of utilisable habitat available in ecologically important sites outside of the SPA; Barriers do not significantly impact the populations access to the SPA or other ecologically important sites outside of the SPA.

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
	Guillemot; Razorbill; Puffin.	Breeding population size; Productivity Rate; Distribution (nesting options within the SPA); Forage spatial distribution, extent, abundance and availability; Disturbance at the breeding site; Disturbance at areas ecologically connected to the colony; Barriers to connectivity.	Individuals; Number of fledged young per breeding pair; Numbers and spatial distribution; Location, hectares and forage biomass; Intensity, frequency, timing and duration; Intensity, frequency, timing and duration; Number, location, shape and area (hectares).	Long term SPA population trend is stable or increasing; Sufficient to maintain a stable or increasing population; Sufficient availability of suitable nesting sites throughout the SPA to maintain a stable or increasing population; Sufficient number of locations, area of suitable habitat and available forage biomass to support population target; Disturbance occurs at levels that do not significantly impact on birds at the breeding site; Disturbance occurs at levels that do not significantly impact breeding population; Barriers do not significantly impact the populations access to the SPA or other ecologically important sites outside of the SPA.
Rockabill SPA [IE004014]	Arctic tern; Roseate tern; Common tern.	Breeding population abundance: apparently occupied nests; Productivity rate: fledged young per breeding pair; Distribution: breeding colonies; Prey biomass available; Barriers to connectivity; Disturbance at breeding site.	Number; Mean Number; Number, location and area (hectares); Kilogrammes; Number, location shape and area (hectares); Level of impact.	No significant decline; No significant decline; No significant decline; No significant decline; No significant decline; Human activities should occur at levels that do not adversely affect the breeding species population.

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
River Nanny Estuary and Shore SPA [IE004158]	Herring gull	Population trend.	Percentage change.	Long term population trend stable or increasing.

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
Skerries Islands SPA [IE004122]	Herring Gull	Breeding population size; Productivity Rate; Winter population trend; Distribution (nesting options within the SPA); Winter spatial distribution; Forage spatial distribution, extent, abundance and availability (winter and breeding); Disturbance at breeding or wintering sites; Disturbance at areas ecologically connected to the colony; Roost spatial distribution and extent; Supporting winter habitat: area and quality; Barriers to connectivity (wintering and breeding).	Apparently occupied sites; Number of fledged young per breeding pair; Percentage change in number of individuals; Numbers and spatial distribution; Hectares, time and intensity of use; Location, hectares and forage biomass; Intensity, frequency, timing and duration; Intensity, frequency, timing and duration; Location and hectares of roosting habitat; Area (hectares) and quality; Number, location, shape and area (hectares).	Long term SPA population trend is stable or increasing; Sufficient to maintain a stable or increasing population; Long term winter population trend is stable or increasing; Sufficient availability of suitable nesting sites throughout the SPA to maintain a stable or increasing population; Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support the population target; Sufficient number of locations, area of suitable habitat and available forage biomass to support population target; Disturbance occurs at levels that do not significantly impact on birds at the breeding or wintering sites; Disturbance occurs at levels that do not significantly impact breeding population; Sufficient number of locations, area and availability of suitable roosting habitat to support the population target; Sufficient area of utilisable habitat available in ecologically important sites outside of the SPA; Barriers do not significantly impact the populations access to the SPA or other ecologically important sites outside of the SPA.

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
Seas of Wexford SPA [IE004237]	Fulmar; Gannet; Lesser black-backed gull; Herring gull; Puffin.	Breeding population size; Spatial distribution; Forage spatial distribution, extent, abundance and availability; Disturbance across the site; Barriers to connectivity.	Number; Hectares, time and intensity of use; Location and hectares, and forage biomass; Intensity, frequency, timing and duration; Number, location, shape and area (hectares).	Long term SPA population trend is stable or increasing; Sufficient number of locations, area, and availability (in terms of timing and intensity of use) of suitable habitat to support population; Sufficient number of locations, area of suitable habitat and available forage biomass to support population target; The intensity, frequency, timing and duration of disturbance occurs at levels that do not significantly impact the achievement of targets for population size and spatial distribution; The number, location, shape and area of barriers do not significantly impact the site populations access to the SPA or other ecologically important sites outside of the SPA.
Dundalk Bay SPA [IE004026]	Black-headed Bull; Common Gull; Herring Gull.	Population trend; Distribution.	Percentage change; Number and range of areas used by waterbirds.	Long term population trend stable or increasing; No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns or variations.
Wexford Harbour and Slobs SPA [IE004076]	Lesser black-backed gull.	Population trend; Distribution.	Percentage change; Number and range of areas used by waterbirds.	Long term population trend stable or increasing; No significant decrease in the numbers or range of areas used by waterbird species, other than that occurring from natural patterns or variations.

Appendix A.2 Conservation Objectives for Marine Mammal and Annex II Features

Table 9.2: Designated Sites, their Marine Mammal and Annex II QIs and Conservation Objectives Screened in for Stage 2 AA

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
Rockabill to Dalkey Island SAC [IE003000]	**Conservation Objectives**: To maintain the favourable conservation condition of harbour porpoise in Rockabill to Dalkey Island SAC			
	Harbour porpoise	. Access to suitable habitat; Disturbance	Number of artificial barriers; Level of impact	Species range within the site should not be restricted by artificial barriers to site use; Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site.
Codling Fault Zone SAC [IE003015]	To maintain the favourable conservation condition of designated marine mammal species in the designated site			
	Harbour porpoise	Access to suitable habitat; Disturbance	Number of artificial barriers; Level of impact	Species range within the site should not be restricted by artificial barriers to site use; Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site.
Lambay Island SAC	**Conservation Objectives**: To maintain the favourable conservation condition of designated marine mammal species in Lambay Island SAC			

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
[IE000204]	Harbour porpoise	Access to suitable habitat; Disturbance	Number of artificial barriers; Level of impact	Species range within the site should not be restricted by artificial barriers to site use; Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site.
	Harbour seal Grey seal	Access to suitable habitat; Breeding behaviour; Moulting behaviour; Resting behaviour; Disturbance	Number of artificial barriers; Breeding sites; Moult haul-out sites; Resting haul-out sites; Level of impact	Species range within the site should not be restricted by artificial barriers to site use; The breeding sites should be maintained in a natural condition; The moult haul-out sites should be maintained in a natural condition; The resting haul-out sites should be maintained in a natural condition; Human activities should occur at levels that do not adversely affect the harbour seal population at the site.
North Anglesey Marine SAC	**Conservation Objectives**: To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for Harbour Porpoise in UK waters:			

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
[UK0030398]	Harbour porpoise	Viability of harbour porpoise; Disturbance; Condition of supporting habitats and process and availability of prey	Harbour porpoise is a viable component of the site; There is no significant disturbance of the species; The condition of supporting habitats and processes, and the availability of prey is maintained.	The intent of this objective is to minimise the risk of injury and killing or other factors that could restrict the survivability and reproductive potential of harbour porpoise using the site; Therefore, operations within or affecting the site should be managed to ensure that the animals' potential usage of the site is maintained; Further work is needed to assess historic, existing and planned levels of plans/projects in the sites and to better understand their impacts on the habitats and prey within the sites.
Blackwater Bank SAC **[IE002953]**	To maintain the favourable conservation condition of designated marine mammal species in the designated site			
	Harbour porpoise	Access to suitable habitat; Disturbance	Number of artificial barriers; Level of impact	Species range within the site should not be restricted by artificial barriers to site use; Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site
West Wales Marine SAC	**Conservation Objectives:** To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for harbour porpoise in UK waters:			

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
[UK0030397]	Harbour porpoise	Viability of harbour porpoise; Disturbance; Condition of supporting habitats and process and availability of prey	Harbour porpoise is a viable component of the site; There is no significant disturbance of the species; The condition of supporting habitats and processes, and the availability of prey is maintained.	The intent of this objective is to minimise the risk of injury and killing or other factors that could restrict the survivability and reproductive potential of harbour porpoise using the site; Therefore, operations within or affecting the site should be managed to ensure that the animals' potential usage of the site is maintained; Further work is needed to assess historic, existing and planned levels of plans/projects in the sites and to better understand their impacts on the habitats and prey within the sites.

Lleyn Peninsula and the Sarnau SAC [UK0013117]	Bottlenose dolphin	Population; Range; Supporting habitats and species; Restoration and recovery	Population – Contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression; Range – Range within the SAC and adjacent inter-connected areas is not constrained or hindered, and there are appropriate and sufficient food resources with the SAC and beyond, and the supporting habitat used by these species are accessible and their extent and quality is stable or increasing; Supporting habitats and species - The abundance of prey species subject to existing commercial fisheries needs to be equal to or greater than that required to achieve maximum sustainable yield and secure in the long term. The management and control of activities or operations likely to adversely affect the species feature, is appropriate for maintaining it in favourable condition and is secure in the long term. Contamination of potential prey species should be below concentrations potentially harmful to their physiological health and disturbance by human activity is below levels that suppress reproductive success, physiological health or long-term behaviour.	The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements are population size, structure, production, and condition of the species within the site; The natural range of the population is not being reduced or likely to be reduced for the foreseeable future; The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include distribution, extent, structure, function and quality of habitat, prey availability and quality.

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
			Restoration and recovery – Populations should be increasing.	

	Grey seal		Population – Reduction should not occur as a result of human activity; Range – Range within the SAC and adjacent inter-connected areas is not constrained or hindered, and there are appropriate and sufficient food resources with the SAC and beyond, and the supporting habitat used by these species are accessible and their extent and quality is stable or increasing; Supporting habitats and species - The abundance of prey species subject to existing commercial fisheries needs to be equal to or greater than that required to achieve maximum sustainable yield and secure in the long term. The management and control of activities or operations likely to adversely affect the species feature, is appropriate for maintaining it in favourable condition and is secure in the long term. Contamination of potential prey species should be below concentrations potentially harmful to their physiological health and disturbance by human activity is below levels that suppress reproductive success, physiological health or long-term behaviour.	

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
Carnsore Point SAC [IE002269]	To maintain the favourable conservation condition of designated marine mammal species in the designated site			
	Harbour porpoise	Access to suitable habitat; Disturbance	Number of artificial barriers; Level of impact	Species range within the site should not be restricted by artificial barriers to site use; Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site
Cardigan Bay SAC [UK0012712]	**Conservation Objectives:** To achieve favourable conservation status all the following, subject to natural processes, need to be fulfilled and maintained in the long-term. If these objectives are not met restoration measures will be needed to achieve favourable conservation status.			

	Bottlenose dolphin Grey seal	Population; Range; Supporting habitats and species; Restoration and recovery	The population is maintaining itself on a long-term basis as a viable component of its natural habitat. Important elements include: • population size • structure, production • condition of the species within the site.; The species population within the site is such that the natural range of the population is not being reduced or likely to be reduced for the foreseeable future; The presence, abundance, condition and diversity of habitats and species required to support this species is such that the distribution, abundance and populations dynamics of the species within the site and population beyond the site is stable or increasing. Important considerations include; • distribution • extent • structure • function and quality of habitat • prey availability and quality; Restoration & Recovery - As part of this objective it should be noted that for the bottlenose dolphin populations should be increasing.	Population - As part of this objective it should be noted that for bottlenose dolphin and grey seal; • Contaminant burdens derived from human activity are below levels that may cause physiological damage, or immune or reproductive suppression For grey seal populations should not be reduced as a consequence of human activity; Range - As part of this objective it should be noted that for bottlenose dolphin and grey seal: • Their range within the SAC and adjacent inter-connected areas is not constrained or hindered • There are appropriate and sufficient food resources within the SAC and beyond • The sites and amount of supporting habitat used by these species are accessible and their extent and quality is stable or increasing; Supporting Habitats and Species - As part of this objective it should be noted that; • The abundance of prey species subject to existing commercial fisheries needs to be equal to or greater than that required to

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
				achieve maximum sustainable yield and secure in the long term. • The management and control of activities or operations likely to adversely affect the species feature is appropriate for maintaining it in favourable condition and is secure in the long term. • Contamination of potential prey species should be below concentrations potentially harmful to their physiological health. • Disturbance by human activity is below levels that suppress reproductive success, physiological health or long-term behaviour;
North Channel SAC [UK0030399]	**Conservation Objectives**: To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for Harbour Porpoise in UK waters:			
	Harbour porpoise	Viability of harbour porpoise; Disturbance; Condition of supporting habitats and process and availability of prey	Harbour porpoise is a viable component of the site; There is no significant disturbance of the species; The condition of supporting habitats and processes, and the availability of prey is maintained.	
Hook Head SAC [IE000764]	To maintain the favourable conservation condition of designated marine mammal species in the designated site			

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
	Harbour porpoise	Access to suitable habitat; Disturbance	Number of artificial barriers; Level of impact	Species range within the site should not be restricted by artificial barriers to site use; Human activities should occur at levels that do not adversely affect the harbour porpoise community at the site
	Bottlenose dolphin	Access to suitable habitat; Disturbance	Number of artificial barriers; Level of impact	Species range within the site should not be restricted by artificial barriers to site use; Human activities should occur at levels that do not adversely affect the Bottlenose Dolphin population at the site.
Bristol Channel Approaches SAC [UK0030396]	**Conservation Objectives**: To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for Harbour Porpoise in UK waters:			
	Harbour porpoise	Viability of harbour porpoise; Disturbance; Condition of supporting habitats and process and availability of prey	Harbour porpoise is a viable component of the site; There is no significant disturbance of the species; The condition of supporting habitats and processes, and the availability of prey is maintained.	

Appendix A.3 Conservation Objectives for Annex I Features

Table 9.3: Designated Sites, their Annex I Habitats QIs and Conservation Objectives Screened in for Stage 2 AA

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
Rockabill to Dalkey Island SAC [IE0003000]	**Conservation Objectives**: To maintain the favourable conservation condition of Reefs in Rockabill to Dalkey Island SAC			
	Reefs	Habitat area; Habitat distribution; Community structure	Hectares; Occurrence; Biological composition	The permanent area is stable or increasing, subject to natural processes; Distribution is stable or increasing, subject to natural processes; Conserve the following community types in a natural condition: Intertidal reef community complex; and Subtidal reef community complex
Wicklow Reef SAC [IE002274]	**Conservation Objectives**: To maintain the favourable conservation condition of Reefs in Wicklow Reef SAC			
	Reefs	Habitat area; Distribution; Community structure	Hectares; Occurrence; Biological composition	The permanent habitat area is stable or increasing, subject to natural processes; The distribution of reefs is stable or increasing, subject to natural processes; Conserve the following community type in a natural condition: Current swept subtidal reef community complex.

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
South Dublin Bay SAC [IE000210]	**Conservation Objectives**: To maintain the favourable conservation condition of designated Annex I Habitats species in South Dublin Bay SAC			
	Mudflats and sandflats not covered by seawater at low tide	Habitat area; Community extent; Community structure: *Zostera* density; Community distribution	Hectares; Hectares; Shoots/m²; Hectares	The permanent habitat area is stable or increasing, subject to natural processes; Maintain the extent of the *Zostera*-dominated community, subject to natural processes; Conserve the high quality of the *Zostera*-dominated community, subject to natural processes; Conserve the following community type in a natural condition: Fine sands with *Angulus tenuis* community complex.
	Annual vegetation of drift lines	N/A, none provided by SNCB. COs of North Dublin Bay SAC have been used as a proxy for assessment.		
	Salicornia and other annuals colonizing mud and sand			
	Embryonic shifting dunes			
North Dublin Bay SAC	**Conservation Objectives**: To maintain the favourable conservation condition of designated Annex I Habitats species in North Dublin Bay SAC			

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
[IE000206]	Mudflats and sandflats not covered by seawater at low tide	Habitat area; Community extent; Community structure: *Mytilus edulis* density; Community distribution	Hectares; Hectares; Individuals/m²; Hectares	The permanent habitat area is stable or increasing, subject to natural processes; Maintain the extent of the *Mytilus edulis*-dominated community, subject to natural processes; Conserve the high quality of the *Mytilus edulis*-dominated community, subject to natural processes; Conserve the following community types in a natural condition: Fine sand to sandy mud with *Pygospio elegans* and *Crangon crangon* community complex; Fine sand with *Spio martinensis* community complex.
	Annual vegetation of drift lines	Habitat area; Habitat distribution; Physical structure: functionality and sediment supply; Vegetation structure: zonation; Vegetation composition: typical species and subcommunities; Vegetation composition: negative indicator species	Hectares; Occurrence; Presence/absence of physical barriers; Occurrence; Percentage cover at a representative number of monitoring stops; Percentage cover	Area increasing, subject to natural processes, including erosion and succession; No decline, or change in habitat distribution, subject to natural processes; Maintain the natural circulation of sediment and organic matter, without any physical obstructions; Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession; Maintain the presence of species-poor communities with typical species: sea rocket (*Cakile maritima*), sea sandwort (*Honckenya peploides*), prickly saltwort (*Salsola kali*) and oraches (*Atriplex* spp.); Negative indicator species (including non-natives) to represent less than 5% cover

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
	Salicornia and other annuals colonizing mud and sand	Habitat area; Habitat distribution; Physical structure: sediment supply; Physical structure: creeks and pans; Physical structure: flooding regime; Vegetation structure: zonation; Vegetation structure: vegetation height; Vegetation structure: vegetation cover; Vegetation composition: typical species and sub-communities; Vegetation structure: negative indicator species- *Spartina anglica*	Hectares; Occurrence; Presence/ absence of physical barriers; Occurrence; Hectares flooded; frequency; Occurrence; Centimetres; Percentage cover at a representative number of monitoring stops; Percentage cover; Hectares	Area stable or increasing, subject to natural processes, including erosion and succession; No decline, or change in habitat distribution, subject to natural processes; Maintain, or where necessary restore, natural circulation of sediments and organic matter, without any physical obstructions; Maintain creek and pan structure, subject to natural processes, including erosion and succession; Maintain natural tidal regime; Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession; Maintain structural variation within sward; Maintain more than 90% of area outside creeks vegetated; Maintain the presence of species-poor communities listed in SMP (McCorry and Ryle, 2009); No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*	Habitat area; Habitat distribution; Physical structure: sediment supply; Physical structure: creeks and pans; Physical structure: flooding regime; Vegetation structure: zonation; Vegetation structure: vegetation height; Vegetation structure: vegetation cover; Vegetation composition: typical species and subcommunities; Vegetation structure: negative indicator species – *Spartina anglica*	Hectares; Occurrence; Presence/ absence of physical barriers; Occurrence; Hectares flooded; frequency; Occurrence; Centimetres; Percentage cover at a representative number of monitoring stops; Percentage cover at a representative sample of monitoring stops; Hectares	Area stable or increasing, subject to natural processes, including erosion and succession; No decline or change in habitat distribution, subject to natural processes; Maintain natural circulation of sediments and organic matter, without any physical obstructions; Maintain creek and pan structure, subject to natural processes, including erosion and succession; Maintain natural tidal regime; Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession; Maintain structural variation within sward; Maintain more than 90% area outside creeks vegetated; Maintain range of subcommunities with typical species listed in SMP (McCorry and Ryle, 2009); No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
	Mediterranean salt meadows (*Juncetalia maritimae*)	Habitat area; Habitat distribution; Physical structure: sediment supply; Physical structure: creeks and pans; Physical structure: flooding regime; Vegetation structure: zonation; Vegetation structure: vegetation height; Vegetation structure: vegetation cover; Vegetation composition: typical species and subcommunities; Vegetation structure: negative indicator species – *Spartina anglica*	Hectares; Occurrence; Presence/absence of physical barriers; Occurrence; Hectares flooded; frequency; Occurrence; Centimetres; Percentage cover at a representative sample of monitoring stops; Percentage cover at a representative number of monitoring stops; Hectares	Area stable or increasing, subject to natural processes, including erosion and succession; No decline or change in habitat distribution, subject to natural processes; Maintain/restore natural circulation of sediments and organic matter, without any physical obstructions; Maintain creek and pan structure, subject to natural processes, including erosion and succession; Maintain natural tidal regime; Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession; Maintain structural variation in the sward; Maintain more than 90% of area outside creeks vegetated; Maintain range of subcommunities with characteristic species listed in SMP (McCorry and Ryle, 2009); No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
	Embryonic shifting dunes	Habitat area; Habitat distribution; Physical structure: functionality and sediment supply; Vegetation structure: zonation; Vegetation composition: plant health of foredune grasses; Vegetation composition: typical species and subcommunities; Vegetation composition: negative indicator species	Hectares; Occurrence; Presence/absence of physical barriers; Occurrence; Percentage cover; Percentage cover at a representative number of monitoring stops; Percentage cover	Area stable or increasing, subject to natural processes, including erosion and succession; No decline or change in habitat distribution, subject to natural processes; Maintain the natural circulation of sediment and organic matter, without any physical obstructions; Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession; More than 95% of sand couch (*Elytrigia juncea*) and/or lyme-grass (*Leymus arenarius*) should be healthy (i.e. green plant parts above ground and flowering heads present); Maintain the presence of species-poor communities with typical species: sand couch (*Elytrigia juncea*) and/or lyme-grass (*Leymus arenarius*); Negative indicator species (including non-native species) to represent less than 5% cover

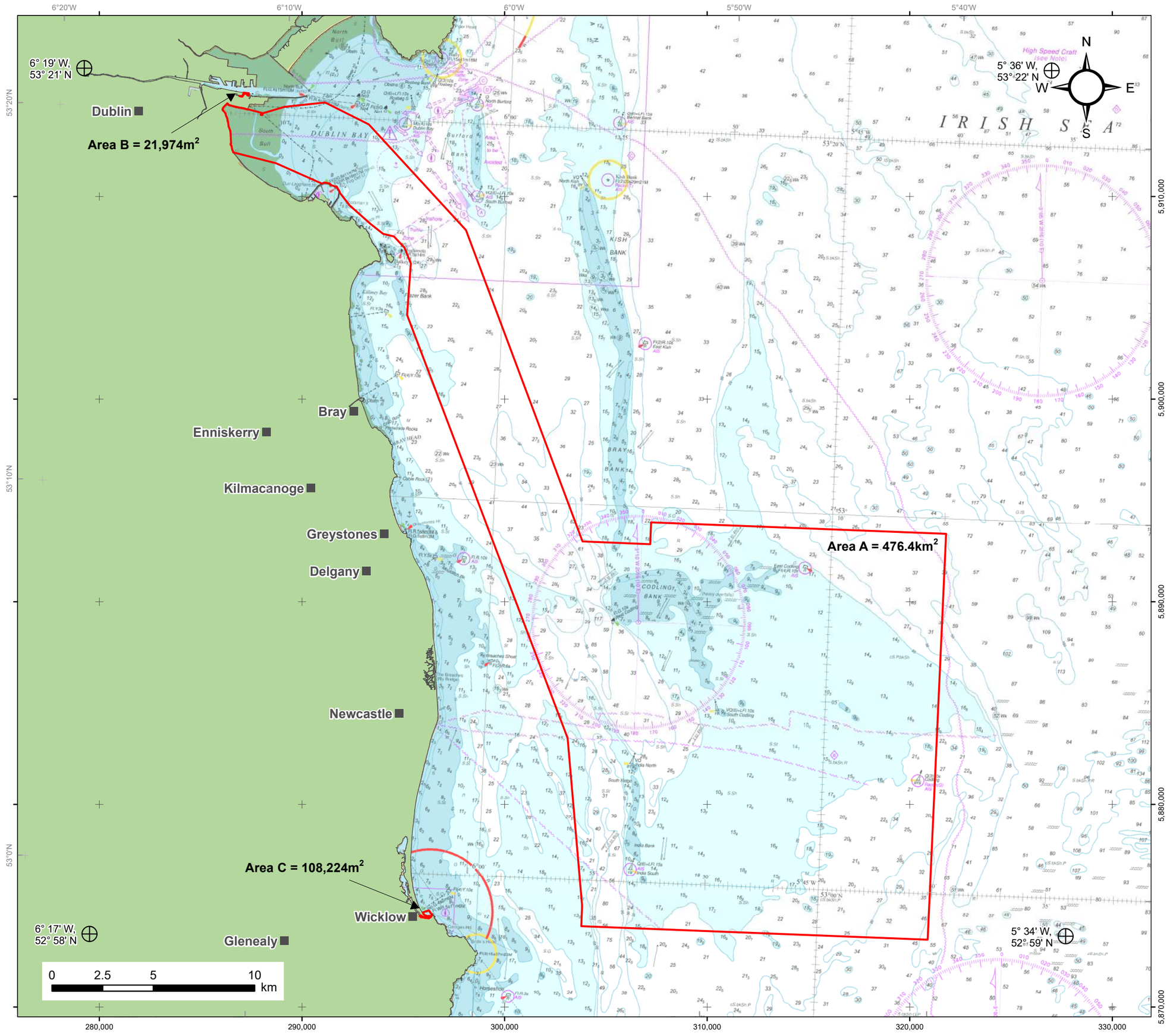
Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)	Habitat area; Habitat distribution; Physical structure: functionality and sediment supply; Vegetation structure: zonation; Vegetation composition: plant health of dune grasses; Vegetation composition: typical species and subcommunities; Vegetation composition: negative indicator species	Hectares; Occurrence; Presence/absence of physical barriers; Occurrence; Percentage cover; Percentage cover at a representative number of monitoring stops; Percentage cover	Area stable or increasing, subject to natural processes including erosion and succession; No decline, or change in habitat distribution, subject to natural processes; Maintain the natural circulation of sediment and organic matter, without any physical obstructions; Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession; 95% of marram grass (*Ammophila arenaria*) and/or lyme-grass (*Leymus arenarius*) should be healthy (i.e. green plant parts above ground and flowering heads present); Maintain the presence of species-poor communities dominated by marram grass (*Ammophila arenaria*) and/or lymegrass (*Leymus arenarius*); Negative indicator species (including non-natives) to represent less than 5% cover

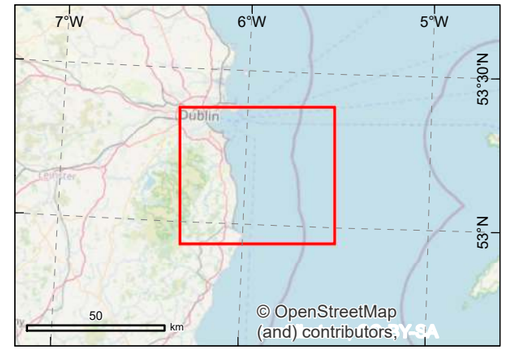
Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
	Fixed coastal dunes with herbaceous vegetation (grey dunes)	Habitat area; Habitat distribution; Physical structure: functionality and sediment supply; Vegetation structure: zonation; Vegetation structure: bare ground; Vegetation structure: sward height; Vegetation composition: typical species and subcommunities; Vegetation composition: negative indicator species (including *Hippophae rhamnoides*); Vegetation composition: scrub/trees	Hectares; Occurrence; Presence/absence of physical barriers; Occurrence; Percentage cover; Centimetres; Percentage cover at a representative number of monitoring stops; Percentage cover; Percentage cover	Area stable or increasing, subject to natural processes including erosion and succession; No decline, or change in habitat distribution, subject to natural processes; Maintain the natural circulation of sediment and organic matter, without any physical obstructions; Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession; Bare ground should not exceed 10% of fixed dune habitat, subject to natural processes; Maintain structural variation within sward; Maintain range of subcommunities with typical species listed in Delaney *et al*. (2013); Negative indicator species (including non-natives) to represent less than 5% cover; No more than 5% cover or under control

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
	Humid dune slacks	Habitat area; Habitat distribution; Physical structure: functionality and sediment supply; Physical structure: hydrological and flooding regime; Vegetation structure: zonation; Vegetation structure: bare ground; Vegetation structure: vegetation height; Vegetation composition: typical species and subcommunities; Vegetation composition: cover of Salix repens; Vegetation composition: negative indicator species; Vegetation composition: scrub/trees	Hectares; Occurrence; Presence/absence of physical barriers; Water table levels; groundwater fluctuations (metres); Occurrence; Percentage cover; Centimetres; Percentage cover at a representative number of monitoring stops; Percentage cover; centimetres; Percentage cover; Percentage cover	Area increasing, subject to natural processes including erosion and succession; No decline or change in habitat distribution, subject to natural processes; Maintain the natural circulation of sediment and organic matter, without any physical obstructions; Maintain natural hydrological regime; Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession; Bare ground should not exceed 5% of dune slack habitat, with the exception of pioneer slacks which can have up to 20% bare ground; Maintain structural variation within sward; Maintain range of subcommunities with typical species listed in Delaney *et al*. (2013); Maintain less than 40% cover of creeping willow (*Salix repens*); Negative indicator species (including non-natives) to represent less than 5% cover; No more than 5% cover or under control

Site Name and Code	QI	Conservation Objectives (detailed where possible)		
		Attribute	Measure	Target
	Petalwort (*Petalophyllum ralfsii*)	Distribution of populations; Population size; Area of suitable habitat; Hydrological conditions: soil moisture; Vegetation structure: height and cover	Number and geographical spread of populations; Number of individuals; Hectares; Occurrence; Centimetres and percentage	No decline; No decline. Population at Bull Island estimated at a maximum of 5,824 thalli. Actual population is more likely to be 5% of this, or c. 300 thalli; No decline. Area of suitable habitat at Bull Island is estimated at c. 0.04ha; Maintain hydrological conditions so that substrate is kept moist and damp throughout the year, but not subject to prolonged inundation by flooding in winter; Maintain open, low vegetation with a high percentage of bryophytes (small acrocarps and liverwort turf) and bare ground

10 APPENDIX B – FIGURES





Licence Area (CWP, 2024.05.20)

High Water Mark (TE, 2024.04.19)

codling wind park	*Project:* Codling Wind Park	*Contractor:* GoBe APEM Group *Website:*
Map title: Fig 1: Maritime Usage Licence Application Area		
Codling doc. number: CWP-CWP-CON-02-01-09-ASM-0001		
Internal descriptive code: TBC	*Sheet size:* A3 *Scale:* 1:180,000	*CRS:* EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
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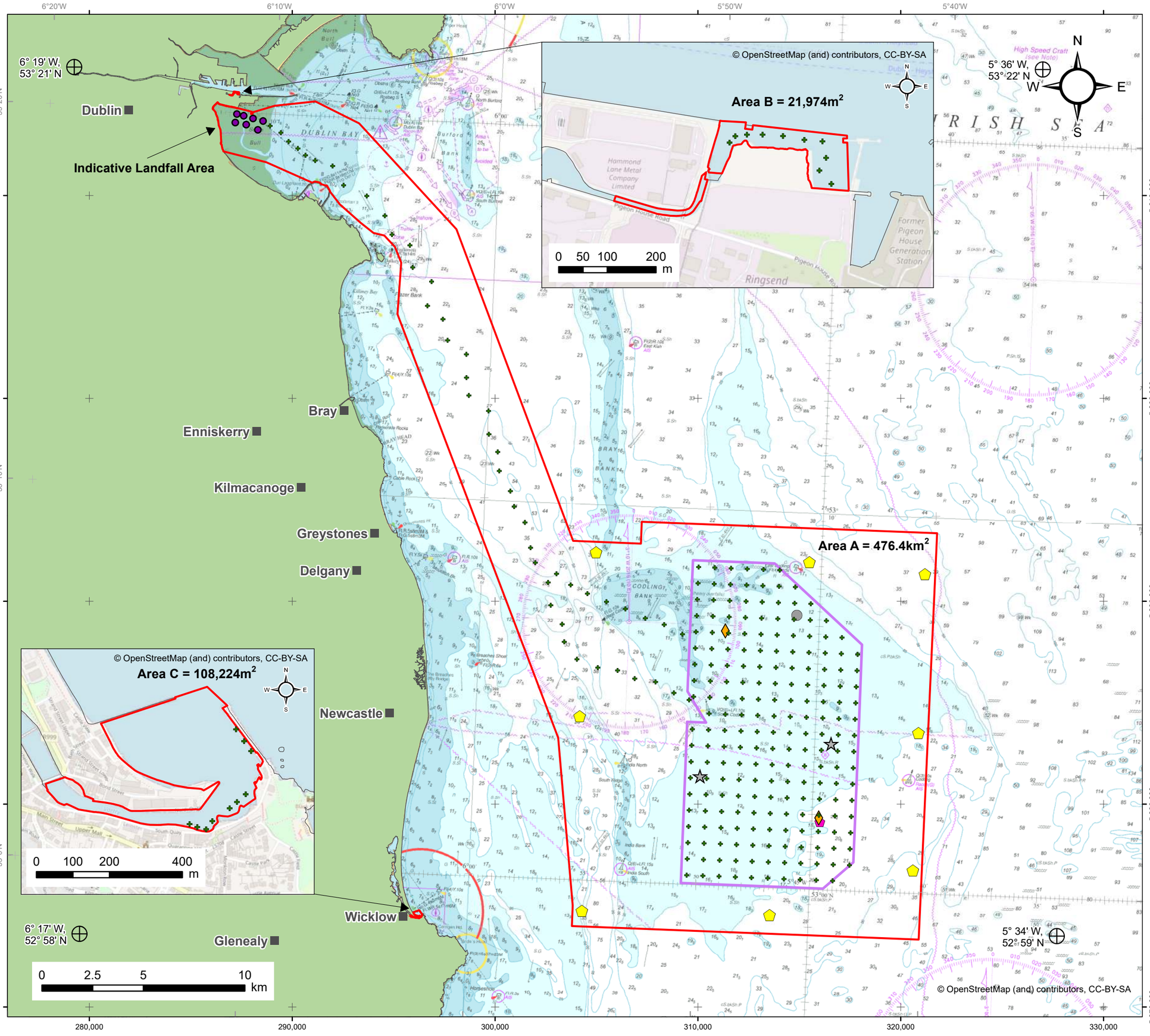

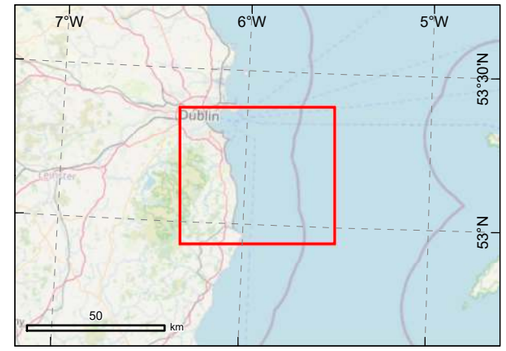

- Licence Area (CWP, 2024.05.20)
- Codling Wind Park Array Area (CWP, 2024.03.05)
- High Water Mark (TE, 2024.04.19)
- Proposed Geotechnical Survey Locations
- Proposed Trial Pit Locations
- Marine Mammal Acoustic Monitoring
- LiDAR buoy
- Metocean buoy
- Seabed frame
- Wave buoy

A conservative approach has been adopted which considers a maximum of 203 locations. Likely the number of geotechnical survey locations will be significantly lower (i.e., c. 60 or 75 boreholes in total and 78 CPTs/VCs).

codling wind park	Project: Codling Wind Park	Contractor: GoBe APEM Group Website:

Map title: Fig 2: Licence Area including Indicative Locations of Geotechnical, Metocean and Marine Mammal Acoustic (Passive Acoustic Monitoring (PAM)) Surveys

Codling doc. number: CWP-CWP-CON-02-01-09-ASM-0001

Internal descriptive code:	*Sheet size:* A3	*CRS:*
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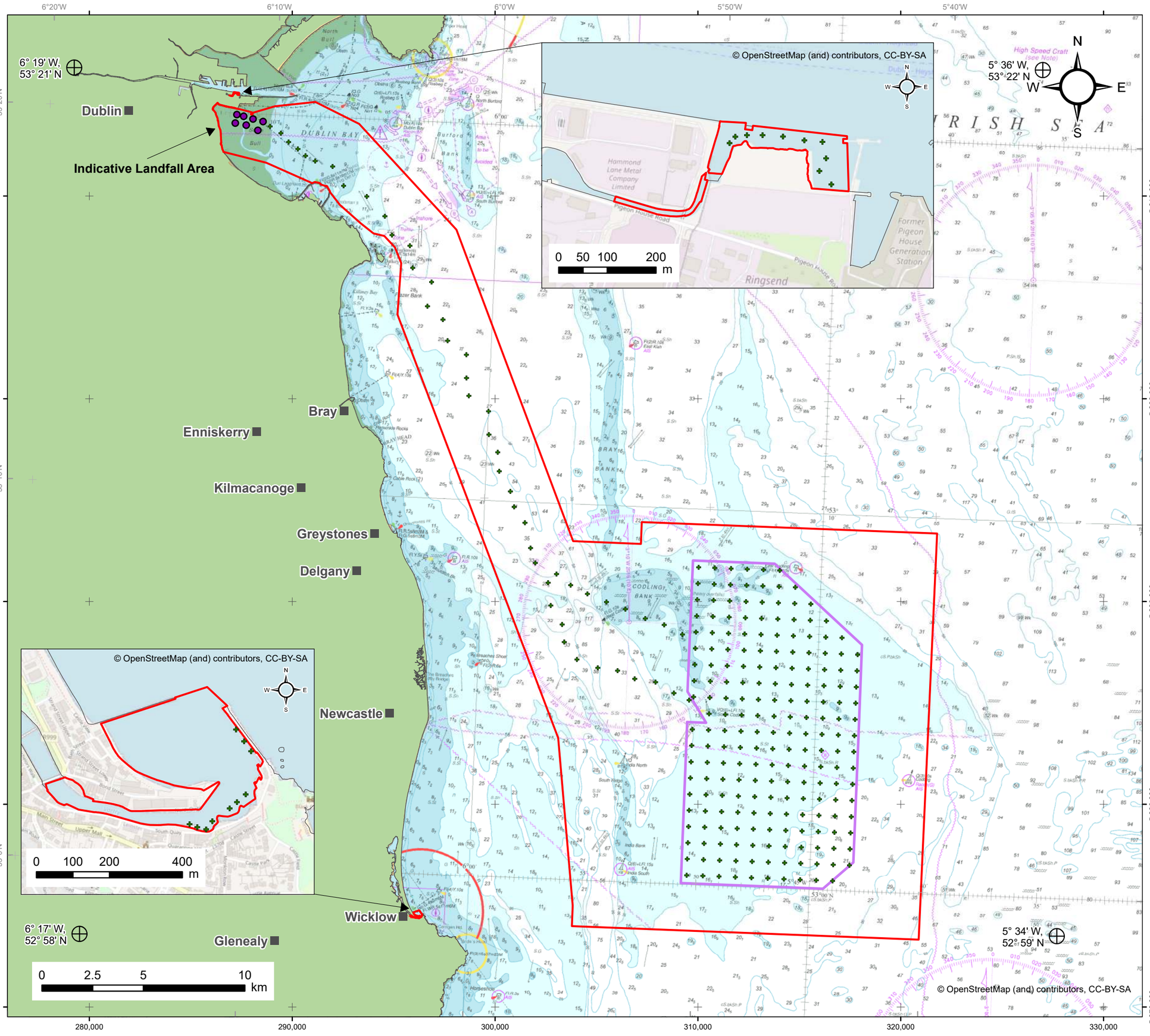
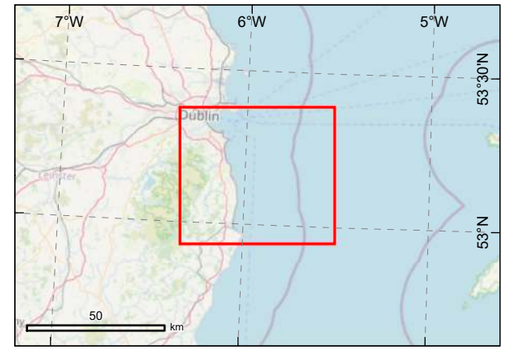
Rev.	Updates	Date	By	Chk'd	App'd
A	First issued	05/08/2024	BPHB	TT	NY



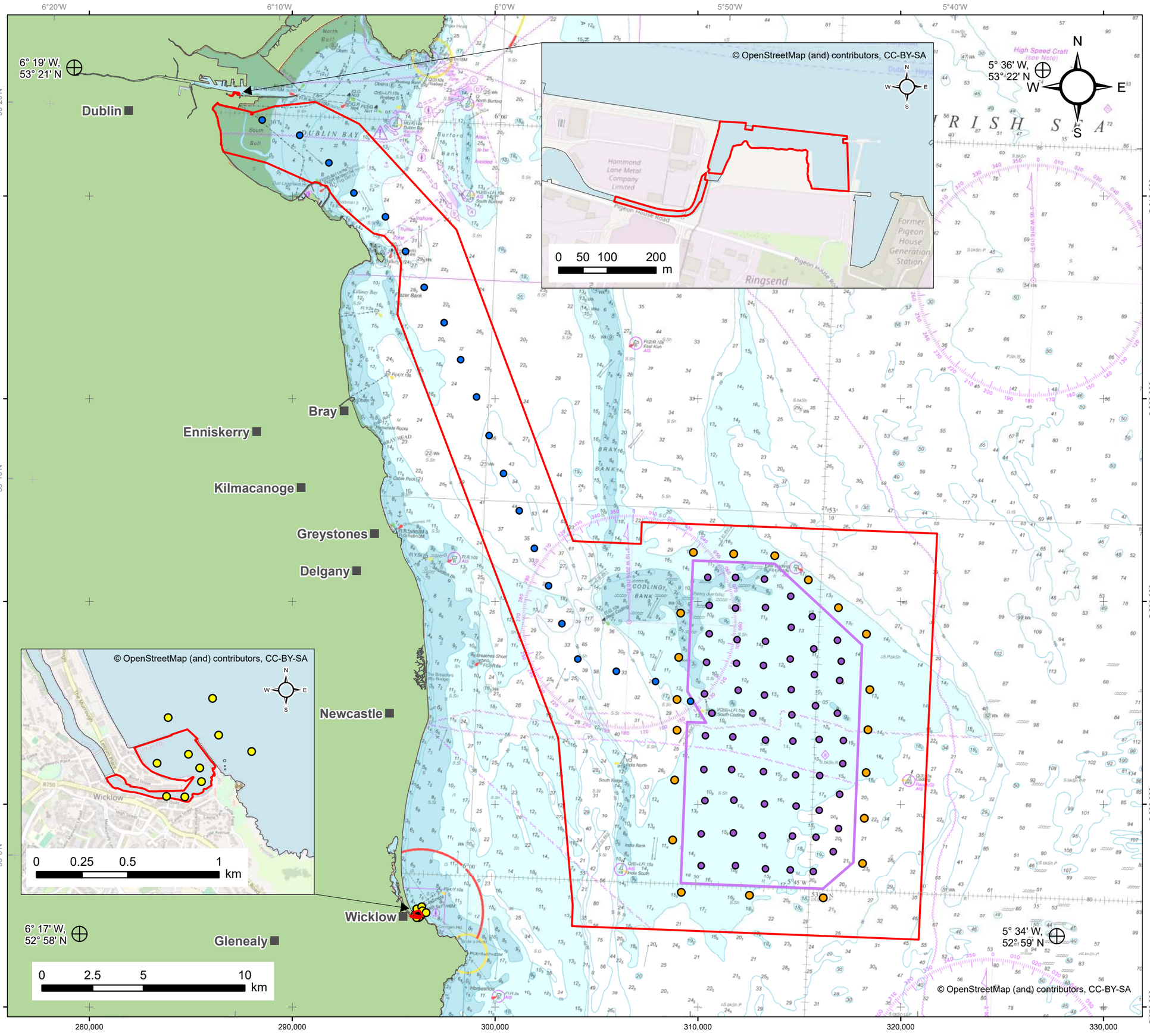


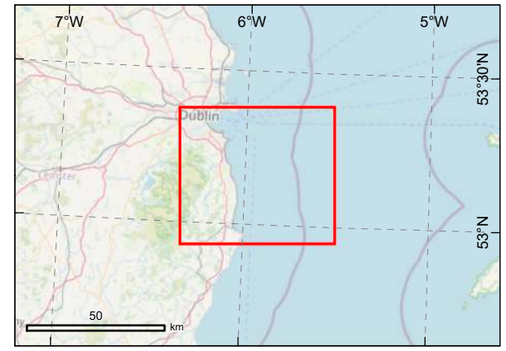
- Licence Area (CWP, 2024.05.20)
- Codling Wind Park Array Area (CWP, 2024.03.05)
- High Water Mark (TE, 2024.04.19)
- Proposed Geotechnical Survey Locations
- Proposed Trial Pit Locations

A conservative approach has been adopted which considers a maximum of 203 locations. Likely the number of geotechnical survey locations will be significantly lower (i.e., c. 60 or 75 boreholes in total and 78 CPTs/VCs).

codling wind park	*Project:* Codling Wind Park	*Contractor:* GoBe APEM Group	*Website:*
Map title: Fig 3: Indicative Geotechnical Survey Locations			
Codling doc. number: CWP-CWP-CON-02-01-09-ASM-0001			
Internal descriptive code: TBC	*Sheet size:* A3 *Scale:* 1:180,000	*CRS:* EPSG 25830	

Rev.	Updates	Date	By	Chk'd	App'd
A	First issued	05/08/2024	BPHB	TT	NY





Licence Area (CWP, 2024.05.20)

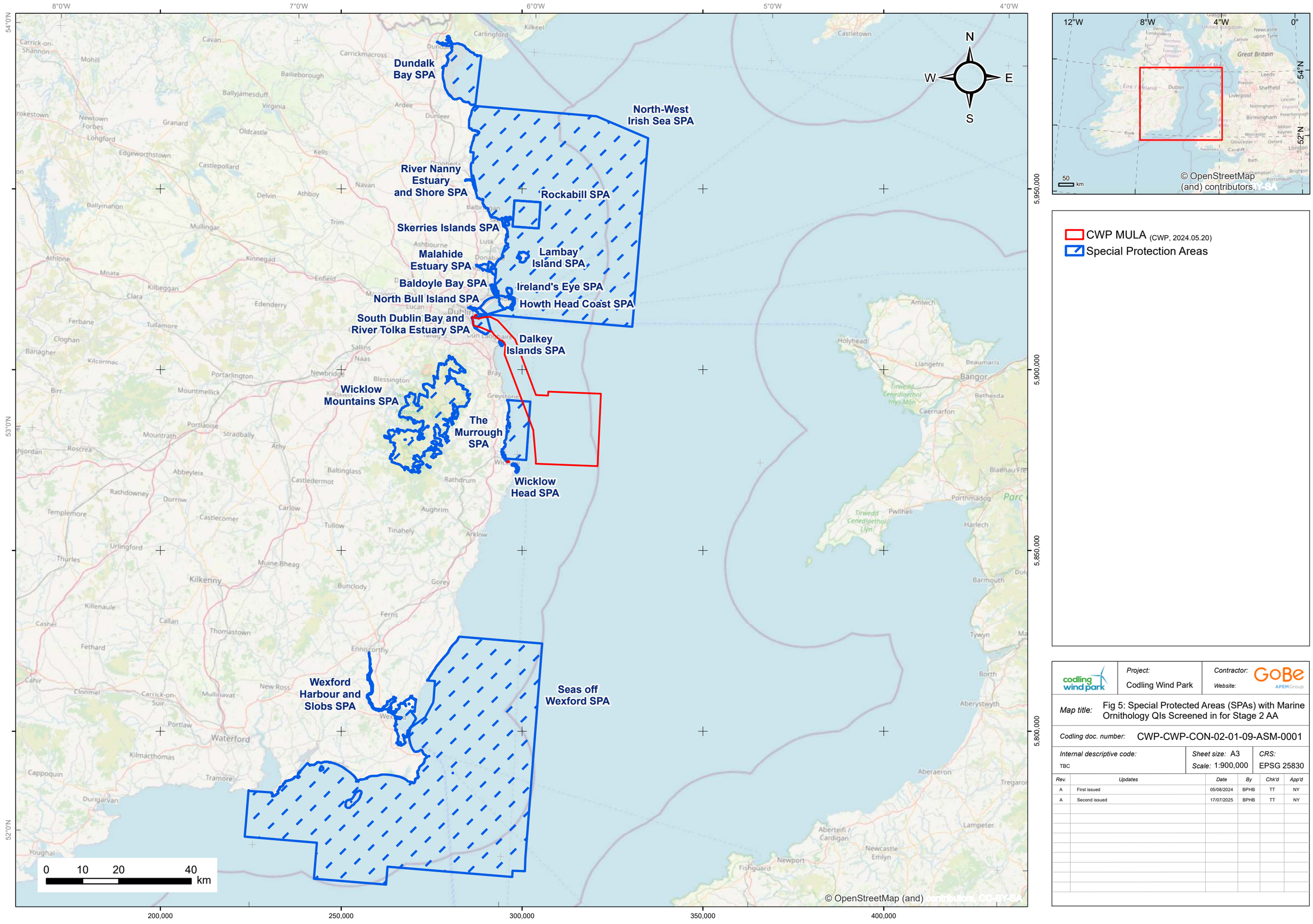
High Water Mark (TE, 2024.04.19)

Grab/Drop Down Video Sampling Site

- Array
- OECC
- Reference Site
- OMB

codling wind park	*Project:* Codling Wind Park	*Contractor:* GoBe APEM Group	*Website:*
Map title:	Fig 4: Indicative Benthic Sampling Station Locations		
Codling doc. number:	CWP-CWP-CON-02-01-09-ASM-0001		
Internal descriptive code: TBC	*Sheet size:* A3 *Scale:* 1:180,000	*CRS:* EPSG 25830	

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
A	First issued	05/08/2024	BPHB	TT	NY



CWP MULA (CWP, 2024.05.20)
Special Protection Areas

codling wind park	*Project:* Codling Wind Park	*Contractor:* GoBe APEM Group	*Website:*

Map title: Fig 5: Special Protected Areas (SPAs) with Marine Ornithology QIs Screened in for Stage 2 AA

Codling doc. number: CWP-CWP-CON-02-01-09-ASM-0001

Internal descriptive code:	*Sheet size:* A3	*CRS:*
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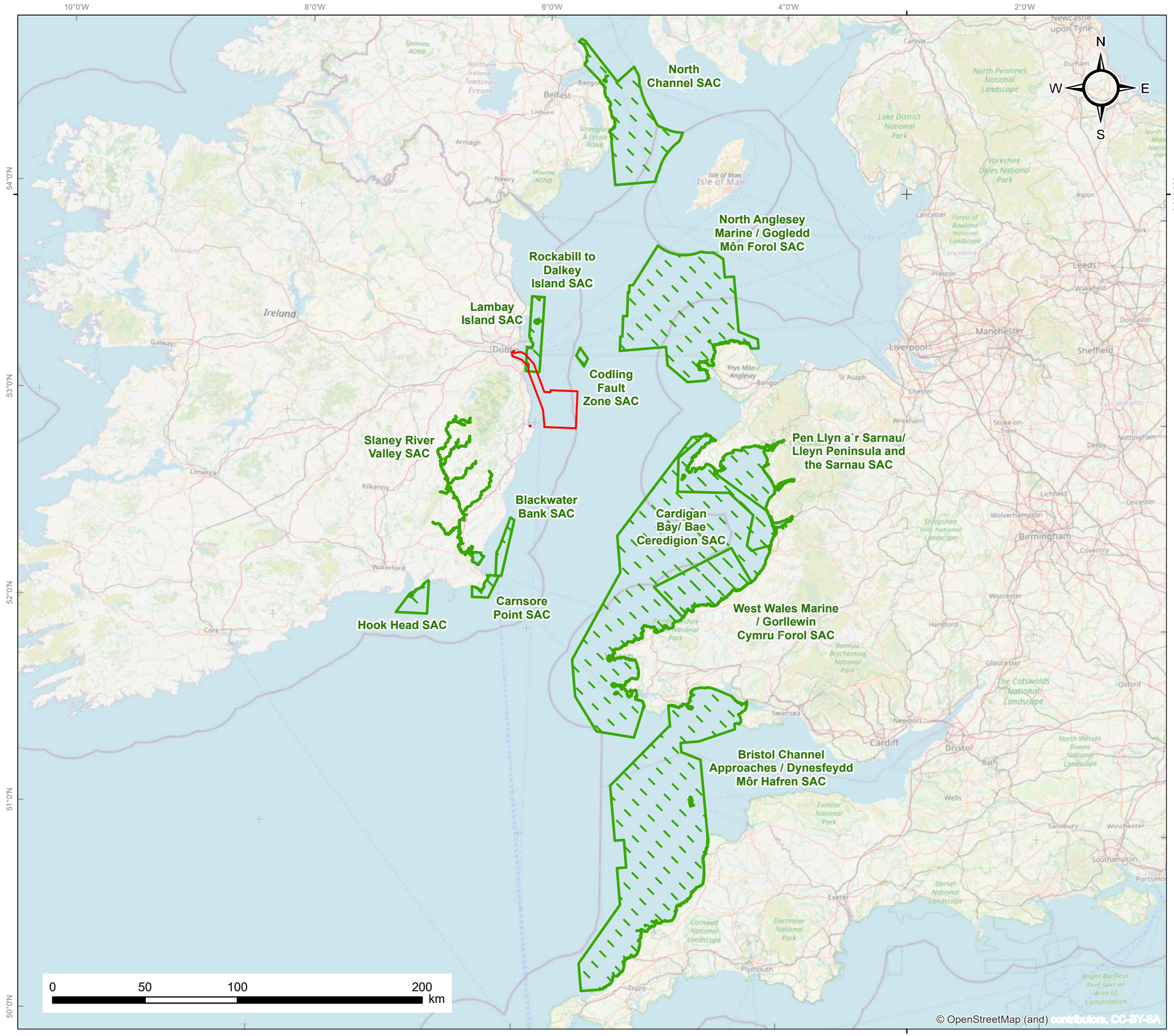
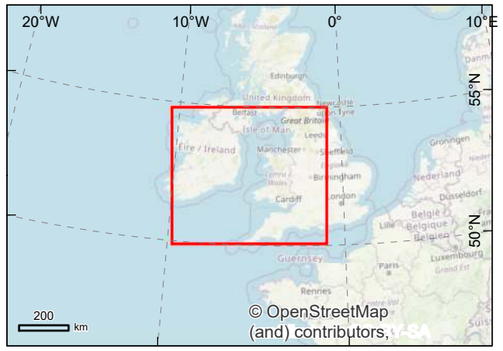
Rev.	Updates	Date	By	Chk'd	App'd
A	First issued	05/08/2024	BPHB	TT	NY
A	Second issued	17/07/2025	BPHB	TT	NY



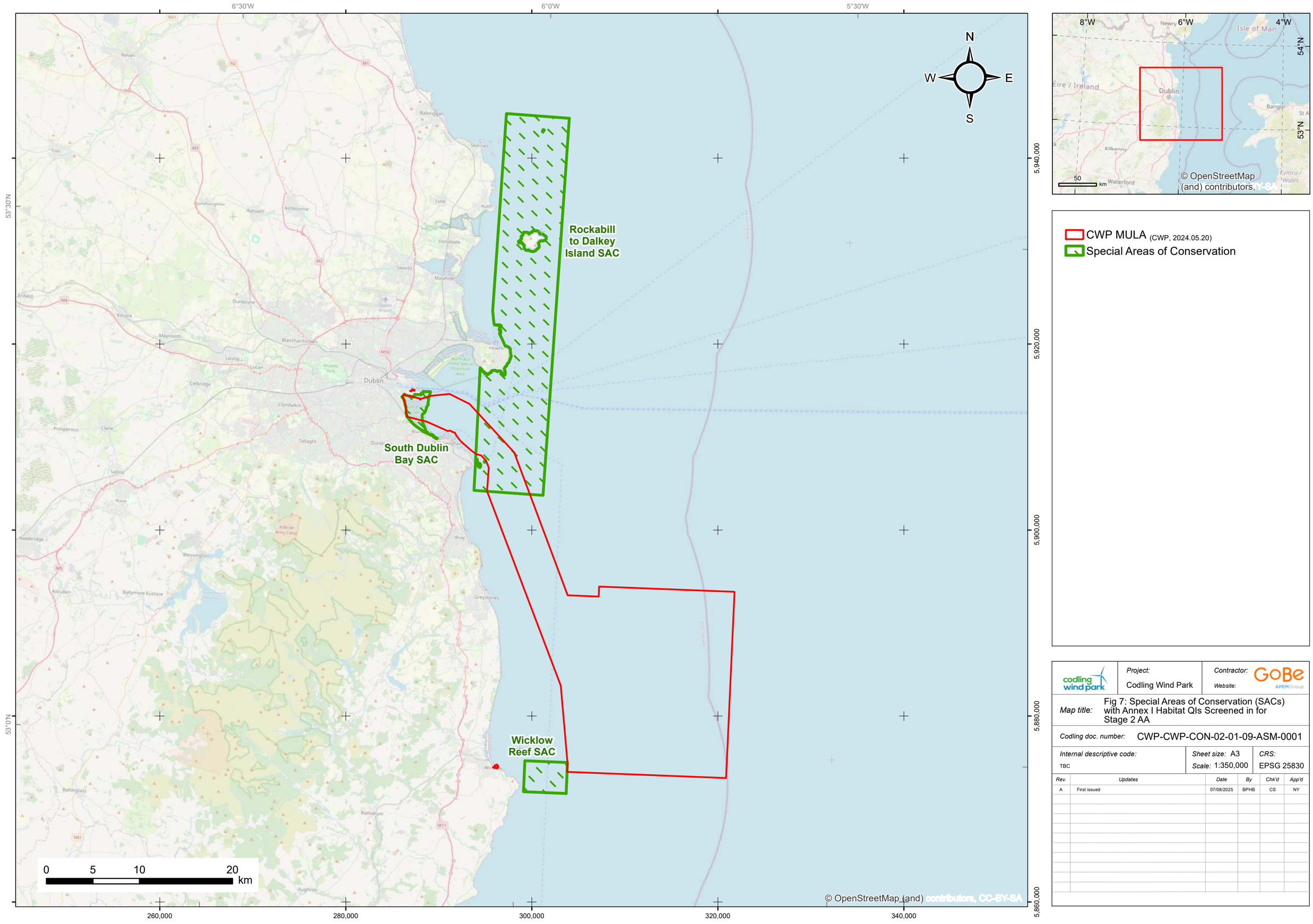


CWP MULA (CWP, 2024.05.20)

Special Areas of Conservation

codling wind park	*Project:* Codling Wind Park	*Contractor:* GoBe APEM Group *Website:*	
Map title:	Fig 6: Special Areas of Conservation (SACs) with Marine Mammal and Other Annex II Species QIs Screened in for Stage 2 AA		
Codling doc. number:	CWP-CWP-CON-02-01-09-ASM-0001		
Internal descriptive code: TBC	*Sheet size:* A3 *Scale:* 1:2,000,000	*CRS:* EPSG 25830	

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
A	First issued	25/09/2025	BPHB	CS	NY

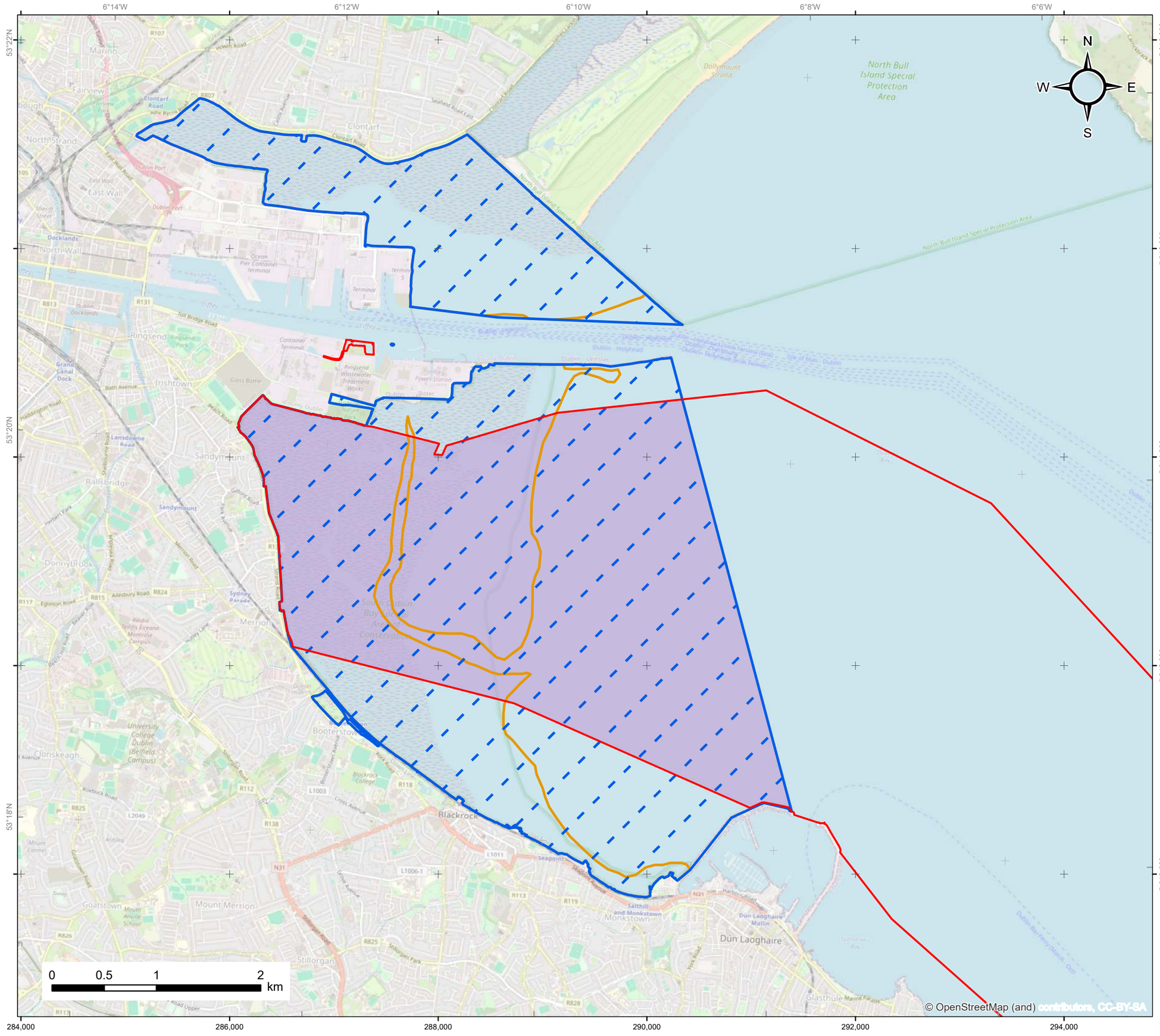


CWP MULA (CWP, 2024.05.20)

Special Areas of Conservation

codling wind park	*Project:* Codling Wind Park	*Contractor:* GoBe APEM Group *Website:*	
Map title: Fig 7: Special Areas of Conservation (SACs) with Annex I Habitat QIs Screened in for Stage 2 AA			
Codling doc. number: CWP-CWP-CON-02-01-09-ASM-0001			
Internal descriptive code: TBC	*Sheet size:* A3 *Scale:* 1:350,000	*CRS:* EPSG 25830	

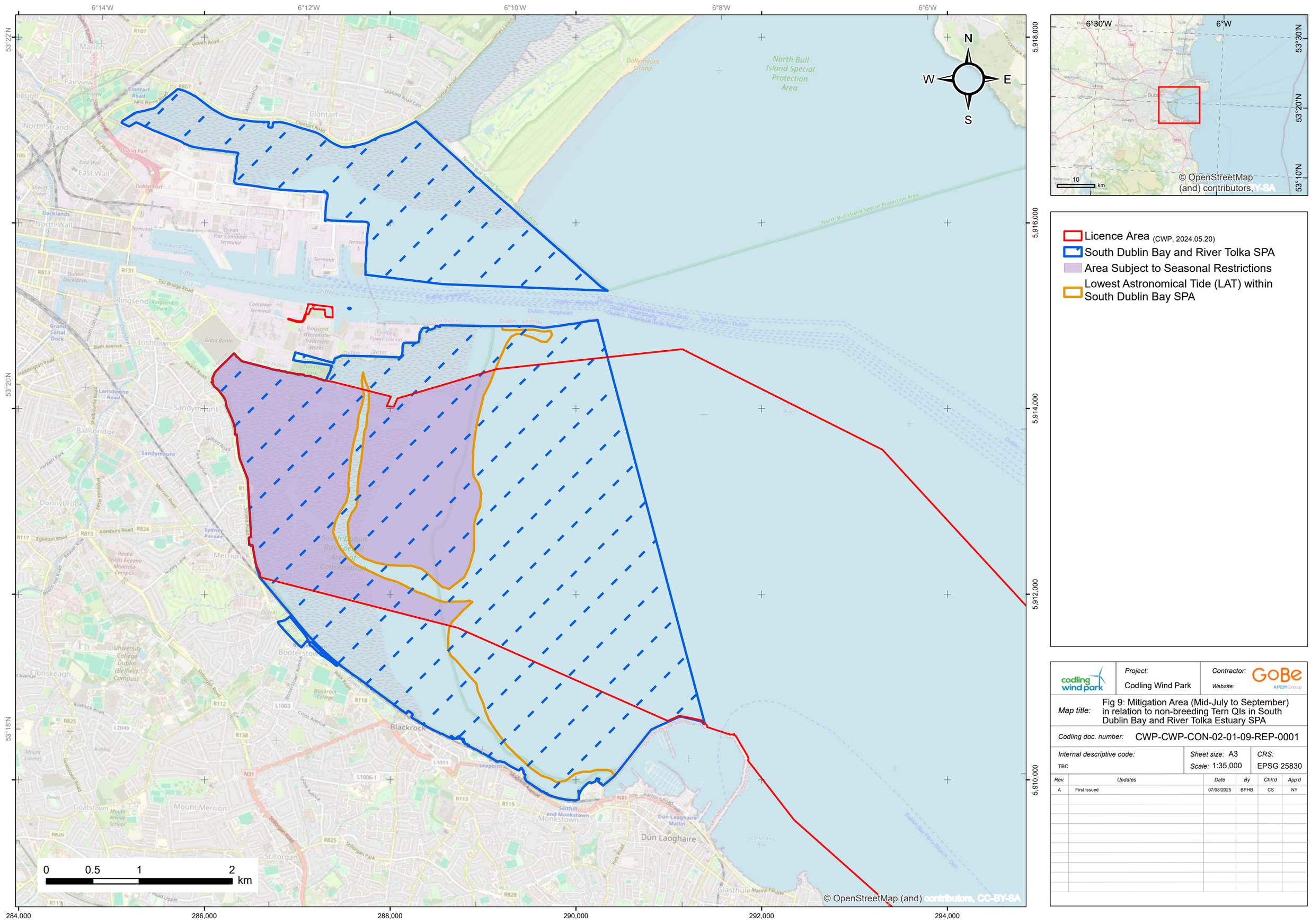
Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
A	First issued	07/08/2025	BPHB	CS	NY



- Licence Area (CWP, 2024.05.20)
- South Dublin Bay and River Tolka SPA
- Area Subject to Seasonal Restrictions
- Lowest Astronomical Tide (LAT) within South Dublin Bay and River Tolka Estuary SPA

codling wind park	*Project:* Codling Wind Park	*Contractor:* GoBe (APEM Group)	*Website:*
Map title:	Fig 8: Mitigation Area (October to March) in relation to Overwintering Waterbird QIs in South Dublin Bay and River Tolka Estuary SPA		
Codling doc. number:	CWP-CWP-CON-02-01-09-REP-0001		
Internal descriptive code: TBC	*Sheet size:* A3	*Scale:* 1:35,000	*CRS:* EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
A	First issued	07/08/2025	BPHB	CS	NY



- Licence Area (CWP, 2024.05.20)
- South Dublin Bay and River Tolka SPA
- Area Subject to Seasonal Restrictions
- Lowest Astronomical Tide (LAT) within South Dublin Bay SPA

codling wind park	*Project:* Codling Wind Park	*Contractor:* GoBe APEM Group *Website:*
Map title:	Fig 9: Mitigation Area (Mid-July to September) in relation to non-breeding Tern QIs in South Dublin Bay and River Tolka Estuary SPA	
Codling doc. number:	CWP-CWP-CON-02-01-09-REP-0001	
Internal descriptive code: TBC	*Sheet size:* A3 *Scale:* 1:35,000	*CRS:* EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
A	First issued	07/08/2025	BPHB	CS	NY