codling wind park

Natura Impact Statement

Volume 5

Assessment of Implications for Special Protection Areas - Part 1


codling
wind park

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Abbreviations

Abbreviation	Term in full
AAM	Alternative Alignment for the purposes of Modelling
AESI	Adverse Effect on Site Integrity
CEMP	Construction Environmental Management Plan
CRM	Collision Risk Modelling
CWP	Codling Wind Park
CWPL	Codling Wind Park Limited
EC	European Commission
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EMF	Electromagnetic Frequency
ESB	Electricity Supply Board
ESBN	ESB Networks
EU	European Union
FOS	Fred. Olsen Seawind
INNS	Invasive non-native species
kV	Kilovolt
MHWS	Mean high water springs
MLWS	Mean low water springs
NIS	Natura Impact Statement
NPWS	National Parks and Wildlife Services
OECC	Offshore Export Cable Corridor
OWF	Offshore wind farm
O&M	Operations and maintenance
OMB	Operations and maintenance base
OSS	Offshore substation structure
PLGR	Pre-Lay Grapnel Run
SAC	Special Area of Conservation
SCI	Special Conservation Interest
SPA	Special Protection Area
SSC	Suspended Sediment Concentration
TTS	Temporary Threshold Shift

Abbreviation	Term in full
TJB	Transition joint bay
TSHD	Trailing Suction Hopper Dredger
UXO	Unexploded Ordinance
WTG	Wind turbine generator

Definitions

Glossary	Meaning
array site	The red line boundary area within which the wind turbine generators (WTGs), inter-array cables (IACs) and the Offshore Substation Structures (OSSs) are proposed.
Codling Wind Park (CWP) Project	The proposed development as a whole is referred to as the Codling Wind Park (CWP) Project, comprising of the offshore infrastructure, the onshore infrastructure and any associated temporary works.
Codling Wind Park Limited (CWPL)	A joint venture between Fred. Olsen Seawind (FOS) and Électricité de France (EDF) Renewables, established to develop the CWP Project.
ESB Networks (ESBN)	Owner of the electricity distribution system in the Republic of Ireland, responsible for carrying out maintenance, repairs and construction on the grid.
Environmental Impact Assessment (EIA)	A systematic means of assessing the likely significant effects of a proposed project, undertaken in accordance with the EIA Directive and the relevant Irish legislation.
Environmental Impact Assessment Report (EIAR)	The report prepared by the Applicant to describe the findings of the EIA for the CWP Project.
export cables	The cables, both onshore and offshore, that connect the offshore substations with the onshore substation.
interconnector cables	The subsea electricity cables between OSSs
landfall	The point at which the offshore export cables are brought onshore and connected to the onshore export cables via the transition joint bays (TJB).
offshore development area	The entire footprint of the offshore infrastructure and associated temporary works that will form the offshore boundary for the development consent application.
offshore export cables	The cables which transport electricity generated by the WTGs from the offshore substations (OSSs) to the landfall.
offshore export cable corridor (OECC)	The area between the array site and the landfall, within which the offshore export cables cable will be installed along with cable protection and other temporary works for construction.
offshore infrastructure	The offshore infrastructure, comprising of the WTGs, IACs, OSSs, Interconnector cables, offshore export cables and other associated infrastructure such as cable and scour protection.
offshore substation structure (OSS)	A fixed structure located within the array site, containing electrical equipment to aggregate the power from the wind turbine generators and convert it into a more suitable form for export to shore.
onshore substation	Site containing electrical equipment to enable connection to the national grid.
operations and maintenance (O&M) activities	Activities (e.g., monitoring, inspections, reactive repairs, planned maintenance) undertaken during the O&M phase of the CWP Project.

Glossary	Meaning
O&M phase	This is the period of time during which the CWP project will be operated and maintained.
operations and maintenance base (OMB)	The operational and maintenance facilities to support the CWP Project, including buildings/warehouses, laydown areas, cranes, parking and marine works such as pontoons for maintenance vessels.
planning application boundary	The area subject to the application for development consent, including all permanent and temporary works for the CWP Project.
Poolbeg 220kV substation	This is the ESBN substation that the ESBN network cables connect into, from the onshore substation. This substation will then transfer the electricity onwards to the national grid
Strategic Infrastructure Development	Strategic Infrastructure Development includes development which would: - contribute significantly to meeting any of the objectives of the National Planning Framework, or - contribute significantly to meeting any regional spatial and economic strategy for an area, or - have a significant effect on the area of more than one planning authority.
transition joint bay (TJB)	This is required as part of the OTI and is located at the landfall. It is an underground bay housing a joint which connects the offshore and onshore export cables.
wind turbine generator (WTG)	All the components of a wind turbine, including the tower, nacelle, and rotor.

1 INTRODUCTION

1. This volume of the NIS provides the scientific examination of the CWP Project on relevant European sites (Special Protection Areas (SPAs)), to identify and characterise any possible implications of the CWP Project on the integrity of European sites.

2. The NIS is laid out as follows:

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

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

2 EXAMINATION AND ANALYSIS OF POTENTIAL IMPACTS ON EUROPEAN SITES

4. Of the European Sites screened in for consideration in this NIS, two overlap with the Planning Application Boundary, while a further two are considered functionally connected to those overlapping Sites on the basis of linkage referenced within their Conservation Objectives or Site Synopsis. Collectively these four sites are assessed within **Volume 5 Part 1** (this volume):

   - SPAs which overlap the Planning Application Boundary:
     - **South Dublin Bay and River Tolka Estuary SPA (IE0004024)**. Overlaps with export cable intertidal landfall. Screened in for direct effects on habitat, disturbance and displacement, changes in prey availability, collision and introduction or spread of INNS.
     - **The Murrough SPA (IE0004186)**. SPA boundary extended in 2023. Extended boundary overlaps with offshore export cable corridor. Screened in for direct effects on habitat, disturbance and displacement, changes in prey availability, collision and introduction or spread of INNS.
   - SPAs with functional connectivity to overlapping SPAs noted within their Conservation Objectives / Site Synopsis:
     - **North Bull Island SPA (IE0004006)**. Considered to have functional connectivity with South Dublin Bay and River Tolka Estuary SPA because of the following text within the SPA's Conservation Objectives (NPWS, 2015): "*Please note that this SPA … adjoins South Dublin Bay and River Tolka Estuary SPA … The Conservation Objectives for this site should be used in conjunction with those for … adjacent sites as appropriate*.". Screened in for Screened in for direct effects on habitat, disturbance and displacement, changes in prey availability, collision and introduction or spread of INNS.
     - **Dalkey Islands SPA (IE0004172)**. Considered to have functional connectivity with South Dublin Bay and River Tolka Estuary SPA because of the following text within the SPA's Site Synopsis (NPWS, 2015): "*The site* [Dalkey Islands SPA]*, along with other parts of south Dublin Bay, is used by the three tern species as a major post-breeding/pre-migration autumn roost area. The site is linked to another important post-breeding/pre-migration autumn tern roost area in Dublin Bay* [within South Dublin Bay and River Tolka Estuary SPA]*.".* Screened in for Screened in for direct effects on habitat, disturbance and displacement, changes in prey availability, collision and introduction or spread of INNS.

5. For the above listed sites assessed within **Volume 5 Part 1** which spatially overlap a part of the CWP project, screened in impacts to SCIs of those SPAs relate to in situ and ex situ effects. Specifically, in relation to South Dublin Bay and River Tolka Estuary SPA, works associated with the export cable landfall within intertidal habitats of South Dublin Bay may result in in situ impacts to that SPA, as may works within the offshore export cable corridor where it overlaps with offshore areas within that SPA. Similarly, in relation to The Murrough SPA, works within a very limited area within the offshore export cable corridor may result in in situ impacts to that SPA.

6. For the above listed sites which do not spatially overlap with any part of the CWP project, screened in impacts to SCIs of those SPAs primarily relate to ex situ effects insofar that they do not impact areas within SPA boundaries, i.e., in situ impacts do not generally occur, or where they may they are extremely limited.

7. All other European sites screened in for consideration in this NIS do not overlap with the Planning Application Boundary or have stated functional connectivity within their Conservation Objectives or Site Synopses. Project only impacts to these sites are assessed within **Volume 5 Part 2**.

2.1 Introduction or spread of invasive non-native species: High level assessment for non-overlapping SPAs

8. For impacts relating to the introduction or spread of invasive non-native species (INNS), for the above listed non-overlapping SPAs assessed within Volume 5a (namely North Bull Island SPA and Dalkey Islands SPA), due to there being spatial separation between these SPAs and activities and infrastructure associated with the CWP Project, there is considered to be no potential for CWP Project activities to result in the introduction or spread of INNS within in the in situ habitats used by the SCIs of these SPAs.
9. Potential introduction or spread of INNS impacts to non-overlapping SPAs is entirely limited to potential impacts upon ex situ habitats which may support the SCIs of those SPAs. In light of there being considered to be functional connectivity between these SPAs and South Dublin Bay and River Tolka Estuary SPA in which INNS impacts may occur from export cable landfall activities, CWP Project areas where the introduction or spread of non-native INNS may occur coincide with non-negligible proportions of the ex situ supporting habitats of SCIs from these non-overlapping SPAs.
10. Despite this, the implementation of mitigation measures to align with EU policy (specifically EU Regulation 1143 [regarding the prevention and management of the introduction and spread of INNS]; and The EU Biodiversity Strategy for 2030 [which contains a commitment to manage established INNS and decrease the number of Red List species they threaten by 50% by 2030]) in the form of biosecurity protocols outlined within the CEMP, shall eliminate or reduce CWP Project risk relating to the introduction or spread of invasive non-native species across all areas and phases of the project. This will have the effect of eliminating or reducing potential ex situ introduction or spread of invasive non-native species impacts within supporting habitats of the SCIs of the above listed non-overlapping SPAs.
11. In relation to the Conservation Objectives, attributes and targets for SCIs of all non-overlapping SPAs listed above, for introduction and spread of INNS impacts it can be concluded that there is no impediment to their Conservation Objectives being met for any SCIs and, in turn, that there is **no project-only AESI for these SPAs.**

2.2 South Dublin Bay and River Tolka Estuary SPA (IE004024)

12. This SPA is designated in relation to the following Special Conservation Interests (SCIs) which have been screened in for consideration within the NIS: common tern, Arctic tern, roseate tern, black-headed gull, light-bellied brent goose, oystercatcher, ringed plover, grey plover, knot, sanderling, dunlin, bar-tailed godwit, redshank and 'wetland and waterbirds'.
13. The minimum separation distance between SPA and the array site is 26.20 km.
14. The minimum separation distance between SPA and the offshore export cable corridor (OECC) is 0 km [OECC passes through offshore part of SPA – Area of overlap = 5.06 km^2].
15. The minimum separation distance between SPA and the OECC intertidal landfall is 0 km [OECC intertidal landfall passes through intertidal part of SPA – Area of overlap = 2.26 km^2].

Table 2-1: Assessment of adverse effects on site integrity (project alone) - South Dublin Bay and River Tolka Estuary SPA

Objective:	Attributes and targets	Predicted impact [attribute(s) potentially affected]	Link to assessment	Mitigation	Residual effect	Conclusion
Sterna hirundo - Common tern [A193]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Breeding population abundance – No significant decline 2. Productivity rate – No significant decline 3. Passage population – No significant decline 4. Distribution: breeding colonies – No significant decline 5. Distribution: roosting areas – No significant decline 6. Prey biomass available – No significant decline 7. Barriers to connectivity – No significant increase 8. Disturbance at the breeding site – Human activities should occur at levels that do not adversely affect the breeding common tern population 9. Disturbance at roosting site – Human activities should occur at levels that do not adversely affect the numbers of common tern among the post-breeding aggregation of terns	Direct effects on habitat [1,3,5]	**Section 2.2.1**	None	No change	No AESI
		Disturbance and displacement [1,2,3,4,5,7,8,9]		**Section 2.2.1**	**Section 2.2.1**	No AESI
		Changes in prey availability [1,2,3,6]		None	No change	No AESI
		Collision [1,2,3]		None	No change	No AESI
		Introduction or spread of invasive species [1,2,3,4,5,6]	See SPA-specific assessment in **Section 2.1**			No AESI
Sterna paradisaea - Arctic tern [A194]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Passage population – No significant decline 2. Distribution: roosting areas – No significant decline 3. Prey biomass available – No significant decline 4. Barriers to connectivity – No significant increase 5. Disturbance at roosting site – Human activities should occur at levels that do not adversely affect the numbers of Arctic tern among the post-breeding aggregation of terns	Direct effects on habitat [1,2]	**Section 2.2.2**	None	No change	No AESI
		Disturbance and displacement [1,2,4,5]		**Section 2.2.2**	**Section 2.2.2**	No AESI
		Changes in prey availability [1,3]		None	No change	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2,3]	See SPA-specific assessment in **Section 2.1**			No AESI
Sterna dougallii - Roseate tern [A192]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Passage population – No significant decline 2. Distribution: roosting areas – No significant decline 3. Prey biomass available – No significant decline 4. Barriers to connectivity – No significant increase 5. Disturbance at roosting site – Human activities should occur at levels that do not adversely affect the numbers of roseate tern among the post-breeding aggregation of terns	Direct effects on habitat [1,2]	**Section 2.2.3**	None	No change	No AESI
		Disturbance and displacement [1,2,4,5]		**Section 2.2.3**	**Section 2.2.3**	No AESI
		Changes in prey availability [1,3]		None	No change	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2,3]	See SPA-specific assessment in **Section 2.1**			No AESI
Chroicocephalus ridibundus - Black-headed gull [A179]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.2.5**	**Section 2.2.5**	**Section 2.2.5**	No AESI
		Disturbance and displacement [1,2]		**Section 2.2.5**	**Section 2.2.5**	No AESI
		Changes in prey availability [1, 2]		**Section 2.2.5**	**Section 2.2.5**	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See SPA-specific assessment in **Section 2.1**			No AESI
Branta bernicla - Light-bellied brent goose [A046]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.2.4**	**Section 2.2.4**	**Section 2.2.4**	No AESI
		Disturbance and displacement (including barrier effects) [1,2]		**Section 2.2.4**	**Section 2.2.4**	No AESI
		Changes in prey availability [1,2]		**Section 2.2.4**	**Section 2.2.4**	No AESI
		Collision [1]		None	No change	No AESI

Objective:	Attributes and targets	Predicted impact [attribute(s) potentially affected]	Link to assessment	Mitigation	Residual effect	Conclusion
		Introduction or spread of invasive species [1,2]	See SPA-specific assessment in **Section 2.1**			No AESI
Haematopus ostralegus - Oystercatcher [A130]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.2.4**	**Section 2.2.4**	**Section 2.2.4**	No AESI
		Disturbance and displacement (including barrier effects) [1,2]		**Section 2.2.4**	**Section 2.2.4**	No AESI
		Changes in prey availability [1,2]		**Section 2.2.4**	**Section 2.2.4**	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See SPA-specific assessment in **Section 2.1**			No AESI
Charadrius hiaticula - Ringed plover [A137]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.2.4**	**Section 2.2.4**	**Section 2.2.4**	No AESI
		Disturbance and displacement (including barrier effects) [1,2]		**Section 2.2.4**	**Section 2.2.4**	No AESI
		Changes in prey availability [1,2]		**Section 2.2.4**	**Section 2.2.4**	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See SPA-specific assessment in **Section 2.1**			No AESI
Pluvialis squatarola - Grey plover [A141]– This SCI is proposed for removal from the list of SCIs for the SPA. As a result, a site-specific Conservation Objective has not been set for this species. However, as this SCI has not yet been removed from the list of SCIs for this SPA, it has been assessed against the same Conservation Objective and associated attributes and targets as other wader SCIs of this SPA.						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.2.4**	**Section 2.2.4**	**Section 2.2.4**	No AESI
		Disturbance and displacement (including barrier effects) [1,2]		**Section 2.2.4**	**Section 2.2.4**	No AESI
		Changes in prey availability [1,2]		**Section 2.2.4**	**Section 2.2.4**	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See SPA-specific assessment in **Section 2.1**			No AESI
Calidris canutus - Knot [A143]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.2.4**	**Section 2.2.4**	**Section 2.2.4**	No AESI
		Disturbance and displacement (including barrier effects) [1,2,2]		**Section 2.2.4**	**Section 2.2.4**	No AESI
		Changes in prey availability [1,2]		**Section 2.2.4**	**Section 2.2.4**	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See SPA-specific assessment in **Section 2.1**			No AESI
Calidris alba - Sanderling [A144]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.2.4**	**Section 2.2.4**	**Section 2.2.4**	No AESI
		Disturbance and displacement (including barrier effects) [1]		**Section 2.2.4**	**Section 2.2.4**	No AESI
		Changes in prey availability [1,2]		**Section 2.2.4**	**Section 2.2.4**	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See SPA-specific assessment in **Section 2.1**			No AESI
Calidris alpina - Dunlin [A149]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing	Direct effects on habitat [1,2]	**Section 2.2.4**	**Section 2.2.4**	**Section 2.2.4**	No AESI
		Disturbance and displacement		**Section 2.2.4**	**Section 2.2.4**	No AESI

Objective:	Attributes and targets	Predicted impact [attribute(s) potentially affected]	Link to assessment	Mitigation	Residual effect	Conclusion
	2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	(including barrier effects) [1,2]				
		Changes in prey availability [1,2]		**Section 2.2.4**	**Section 2.2.4**	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See SPA-specific assessment in **Section 2.1**			No AESI
Limosa lapponica - Bar-tailed godwit [A157]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.2.4**	**Section 2.2.4**	**Section 2.2.4**	No AESI
		Disturbance and displacement (including barrier effects) [1,2]		**Section 2.2.4**	**Section 2.2.4**	No AESI
		Changes in prey availability [1,2]		**Section 2.2.4**	**Section 2.2.4**	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See SPA-specific assessment in **Section 2.1**			No AESI
Tringa totanus - Redshank [A162]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.2.4**	**Section 2.2.4**	**Section 2.2.4**	No AESI
		Disturbance and displacement (including barrier effects) [1,2]		**Section 2.2.4**	**Section 2.2.4**	No AESI
		Changes in prey availability [1,2]		**Section 2.2.4**	**Section 2.2.4**	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See SPA-specific assessment in **Section 2.1**			No AESI
Wetland and Waterbirds [A999]						
To maintain the favourable conservation condition of the wetland habitat in the SPA as a resource for the regularly occurring migratory waterbirds that utilise it	1. Habitat area - 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.	Direct effects on habitat [1]	**Section 2.2.6**	**Section 2.2.6**	**Section 2.2.6**	No AESI
		Introduction or spread of invasive species [1]	See SPA-specific assessment in **Section 2.1**			No AESI

2.2.1 Receptor 1: Common tern

Construction Phase Impacts

Construction phase impact 1 – Direct effects on habitat

Array site

Project-only assessment

16. With regards to the array site, relevant construction phase direct effects on habitat relate to the alteration of ex situ sea surface areas as they become occupied by the footprint of installed infrastructure and, therefore, unavailable for use by seabird SCIs to undertake non-foraging behaviours; the array does not result in any in situ direct effects.

17. As construction of the array site progresses through its planned duration of approximately 2.5 years, the above sea level spatial extent of infrastructure will increase to a maximum of less than 0.005 km^2 within the array site (i.e., combined sea level area of all wind turbine generators (WTGs) and offshore substation structures (OSSs). This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Breeding population abundance (no significant decline); and
- Passage population (no significant decline).

18. In relation to these Conservation Objective attributes, construction within the array site may reduce the marine areas in which individuals can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of construction phase activities within the array site may affect the energetic costs of non-foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

19. Despite the above potential pathways to impact, these direct effects on habitat do not affect any area of the SPA (and hence do not affect the distribution of foraging, roosting or breeding habitat of this SCI within the SPA). Further, the area of habitat loss represents a negligible proportion of sea area within the foraging range (mean-maximum + 1. S.D. = 26.9 km, Woodward et al., 2019) of common tern breeding within South Dublin Bay and River Tolka Estuary SPA and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

20. In the context of the area of available habitat within foraging range of the SPA, and the negligible proportion that will be lost within the array site during construction, the scale of direct effects on habitat within the array site is considered to be negligible. In particular, the reduction in marine areas in which to undertake non-foraging behaviours, or requirement to use alternative areas for non-foraging behaviours, is not expected to give rise to energetic costs of non-foraging behaviours in such a way as to affect the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of resulting in a significant decline in the breeding population abundance or passage population of the common tern SCI.

21. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of common tern in the SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the South Dublin Bay and River Tolka Estuary SPA.

Proposed mitigation

22. No specific mitigation is proposed or required in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

23. As per project only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

24. Impacts considered to be direct effects on habitat may arise as a consequence of activities which temporarily disturb areas of intertidal habitat which are utilised by ornithological SCIs. There is no direct loss or removal of intertidal habitat proposed by the CWP project. Direct effects to intertidal areas which may be utilised by birds for non-foraging behaviours (such as roosting, loafing and maintenance) are considered only to relate to the physical footprint of the proposed intertidal infrastructure and works (i.e., the intertidal cable route during construction and any infrastructure at the proposed landfall location).

25. The non-foraging capacity in which the common tern SCI is considered primarily to use the intertidal habitat within South Dublin Bay is for roosting aggregations, especially during the post-breeding period (mid-July to early September).

26. Direct effects on intertidal habitat have the potential to impact on the following Conservation Objective attributes and targets for the common tern SCI of South Dublin Bay and River Tolka Estuary SPA:

- Breeding population abundance (no significant decline);
- Passage population (no significant decline); and
- Distribution: roosting areas (no significant decline).

27. In relation to these Conservation Objective attributes, construction in the OECC landfall area may temporarily reduce the areas in which individuals can undertake non-foraging behaviours (such as roosting) or require individuals to use alternative areas for these non-foraging behaviours. These impacts may affect energetic costs of non-foraging behaviours, which may in turn affect condition of individuals and survival rates.

28. The spatial extent of intertidal habitat within South Dublin Bay and River Tolka Estuary SPA is 21.94 km^2. Approximately 0.16 km^2 of intertidal habitat within South Dublin Bay is estimated to be subject to direct effects as a result of intertidal cable landfall activities (0.04 km^2 from open cut landfall cable duct installation, 0.11 km^2 from cable laying activities in the transition zone, and 0.006 km^2 as a result of the cofferdam installation). This equates to approximately 0.72% of the total intertidal habitat area within the SPA being subject to temporary direct effects on habitat during the construction phase of the proposed intertidal landfall works.

29. Following the backfilling of any excavated sections of trenching and removal of any supporting vehicles and / or infrastructure, it is considered that the re-establishment of intertidal habitat available to birds for non-foraging activities would occur rapidly due to the dynamic nature of intertidal habitats within South Dublin Bay. Any effects on the physical habitat around active intertidal construction loci would be brief, lasting less than several tidal cycles. Intertidal mudflats are considered resilient to isolated physical disturbances and can recover well (OSPAR, 2023).

30. Despite the above potential pathways to impact, in the context of the negligible proportion of intertidal habitat within the SPA which will be affected during construction and the short-term temporary nature of the effects to those habitats, the scale of direct effects on habitat within the OECC intertidal landfall area is considered to be negligible. In particular, the reduction in intertidal areas in which non-foraging behaviours are undertaken (including potential roosting areas used by common tern during the post-breeding period), or requirement to use alternative areas for non-foraging behaviours, is not expected to give rise to energetic costs of non-foraging behaviours in such a way as to affect the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of resulting in a significant decline in the breeding population abundance or passage population of the common tern SCI.

31. Similarly, temporary negligible short-term effects on the distribution of common tern roosting areas within the SPA will not constitute any significant decline in relation to this Conservation Objective attribute.

32. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of common tern in the SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the South Dublin Bay and River Tolka Estuary SPA.

Proposed mitigation

33. No specific mitigation is proposed, or required, in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

34. As per project only assessment, above.

Project-only effect on site integrity conclusion for impact

35. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**, above. With regards to direct effects on habitat impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Construction phase impact 2 – Disturbance and displacement

OECC (Intertidal landfall)

36. Common tern, Arctic tern and roseate tern are three closely related and morphologically similar species. During the post-breeding period and given the low-light conditions in which these species primarily utilise the intertidal habitats of South Dublin Bay and River Tolka Estuary SPA to form nocturnal roosting aggregations, it was generally not possible to differentiate these species during baseline surveys which were used to determine the number of individuals of these SCIs which may experience disturbance and displacement during crepuscular or nocturnal construction phase activities within the intertidal part of the OECC. Consequently, these species are considered collectively in relation to construction phase disturbance and displacement at the OECC intertidal landfall location.

This means that when the impact values for *Sterna* terns are related to the population size of a particular species, the estimates of the proportions impacted are very precautionary.

Project-only assessment

37. Disturbance and displacement have the potential to impact on the following Conservation Objective attributes and targets for the common tern SCI of South Dublin Bay and River Tolka Estuary SPA:

- Breeding population abundance (no significant decline);
- Productivity rate (no significant decline);
- Passage population (no significant decline);
- Distribution: breeding colonies (no significant decline);
- Distribution: roosting areas (no significant decline);
- Barriers to connectivity (no significant decline);
- Disturbance at the breeding site (human activities should occur at levels that do not adversely affect the breeding common tern population); and
- Disturbance at the roosting site (human activities should occur at levels that do not adversely affect the numbers of common tern among the post-breeding aggregation of terns).

38. In relation to these Conservation Objective attributes, construction within the OECC intertidal landfall area may temporarily reduce the areas in which individuals can undertake non-foraging behaviours (such as roosting) or require individuals to use alternative areas for these non-foraging behaviours. These impacts may affect energetic costs of such non-foraging behaviours, which may in turn affect condition of individuals and survival rates.

39. Information relating to the ecological sensitivity of *Sterna* terns to visual and acoustic stimuli can be found in **EIA Chapter 10: Ornithology, Section 10.10.2**. In short, away from their breeding colonies and during diurnal periods within marine habitats, *Sterna* tern species are considered to be moderately insensitive to anthropogenic disturbance (i.e. moderately low disturbance response scores to vessels in Garthe and Hüppop, 2004; and minimal response to vessels in Perrow et al., 2011). However, the sensitivity of terns to disturbance when they are present within intertidal habitats during diurnal periods has not been described. Individuals present with the South Dublin Bay area are nevertheless considered likely to demonstrate a high degree of habituation to potential disturbance inducing stimuli. As such, *Sterna* terns are considered to have moderate inherent ecological sensitivity to acoustic and visual disturbance stimuli during diurnal periods.

40. Baseline acoustic surveys describe an summary of measurement results as having an L_{A90} (i.e., the sound level that is exceeded for 90% of the sample period; it is typically used as a descriptor for background noise) of 55 dB and a L_{Aeq} (i.e., the equivalent continuous sound level; a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period between the times of 1335 and 1516) of 70dB. Piling noise from the CWP project has been modelled in bands of High (>70 dB), Medium (55 dB to 70 dB) and Low (40dB to 55dB) acoustic stimuli (**EIA Chapter 10: Ornithology, Section 10.10.2**). Acoustic disturbance associated with any given piling event during daylight hours, when terns are not forming nocturnal roosting aggregations within South Dublin Bay (from sunrise until approximately two hours before sunset (Tierney et al., 2016)), will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within the South Dublin Bay and River Tolka Estuary SPA during the breeding season (up to 0.3 individuals where the greatest extent of mobile construction activities are implemented (i.e., Alternative Alignment for the purposes of Modelling (AAM) scenario). This represents a up to 1.07% of the average number of *Sterna* terns present within the South Dublin Bay section of the South Dublin Bay and River Tolka Estuary SPA during diurnal baseline surveys (28.02 individuals), up to 0.03% of the SPA common tern breeding population (988 individuals – 2016 count, SMP 2023) and <0.01% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013 – 2018 (7,364

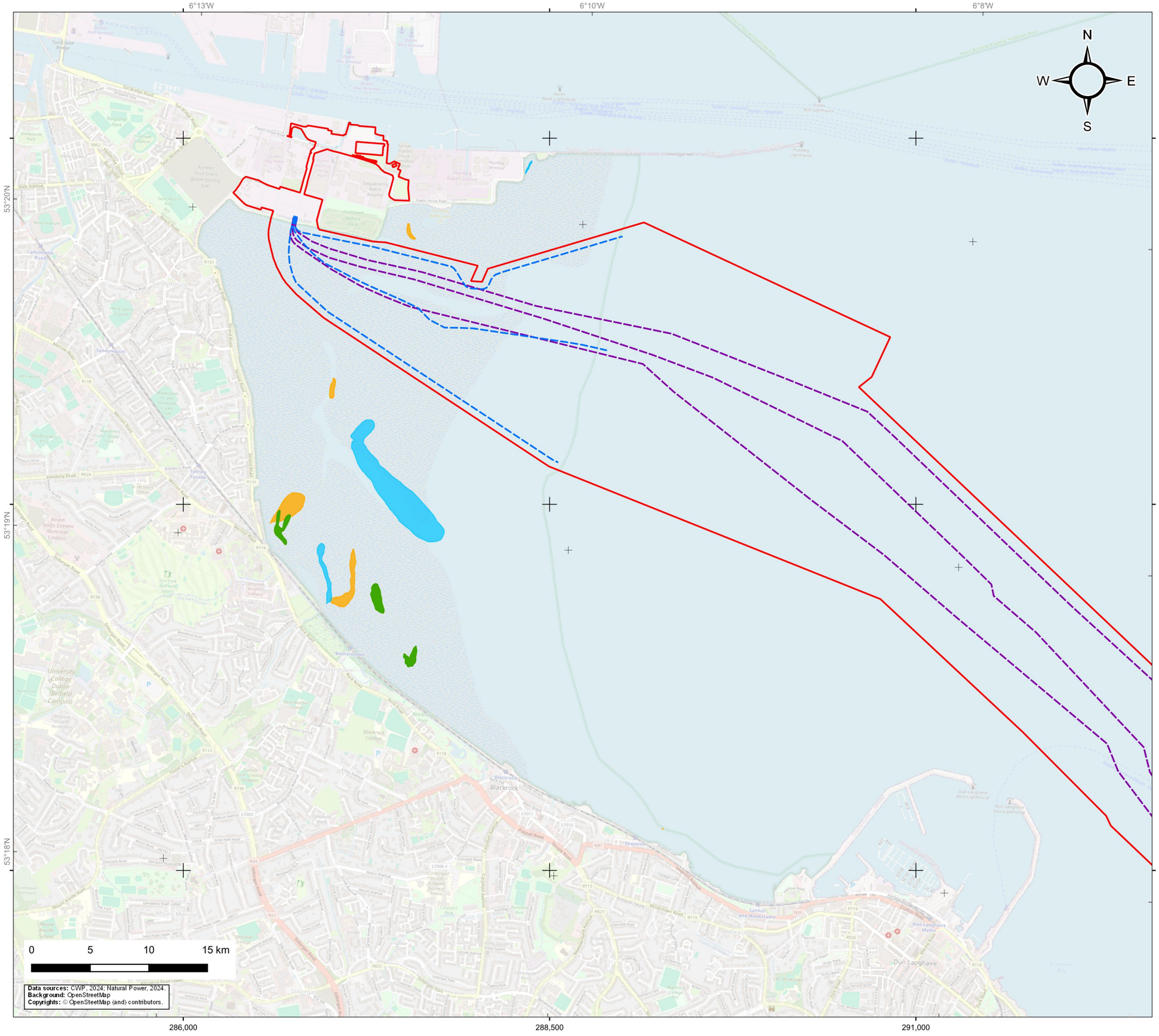
individuals - see Table 3.4 in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

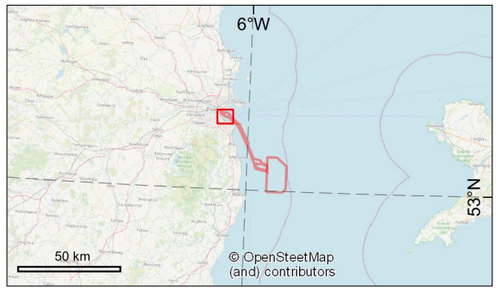
41. Visual stimuli associated with intertidal cable route installation activities between sunrise and approximately two hours before sunset, will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within the South Dublin Bay and River Tolka Estuary SPA (up to 2.88 individuals for the most impactful cable laying route selection). This represents a up to 10.26% of the average number of *Sterna* terns present within the South Dublin Bay section of the South Dublin Bay and River Tolka Estuary SPA during diurnal baseline surveys (28.02 individuals), up to 0.29% of the SPA common tern breeding population (988 individuals – 2016 count, SMP 2023) and 0.04% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013 – 2018 (7,364 individuals - see Table 3.4 in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

42. As such, given the very limited number of individuals potentially experiencing disturbance in relation to diurnal construction phase activities within intertidal areas of South Dublin and River Tolka Estuary SPA, there is no potential for AESI to result from such activities to the common tern SCI of the SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-1** above.

43. Should, however, construction activities be undertaken during periods in which *Sterna* terns form post breeding roosting aggregations within South Dublin Bay (specifically between one hours before sunset through to sunrise, from mid-July to September, inclusive), acoustic and visual stimuli from such activities may result in potential disturbance impacts to larger numbers of *Sterna* terns within the South Dublin Bay and River Tolka Estuary SPA, than if activities were conducted outside of these periods.

44. Unlike during diurnal periods, for which information relating to the ecological sensitivity of *Sterna* terns to visual and acoustic stimuli is available, disturbance responses of nocturnal roosting terns to such stimuli are unknown. As such, in the absence of being able to overlap disturbance effect ranges with receptor distributions, to inform the assessment of potential disturbance and displacement impact magnitudes to roosting tern receptors for intertidal cable installation scenarios, the distribution of potential acoustic (piling) and visual (cable route laying) nocturnal disturbance sources are compared to roosting tern aggregation locations noted during 2020 and 2021 baseline post-breeding tern aggregation surveys (**Figure 2-1** and **Figure 2-2**) and roosting tern aggregation locations which have been noted during other surveys of South Dublin Bay (**Figure 2-3** to **Figure 2-5**).





Legend

- Planning Application Boundary (PAB)
- Offshore export cable
- Offshore export cable – alternative alignment

Post-breeding tern roosting locations

- Sterna tern
- Sandwich tern
- Sterna and sandwich tern

codling wind park

Project: Codling Wind Park

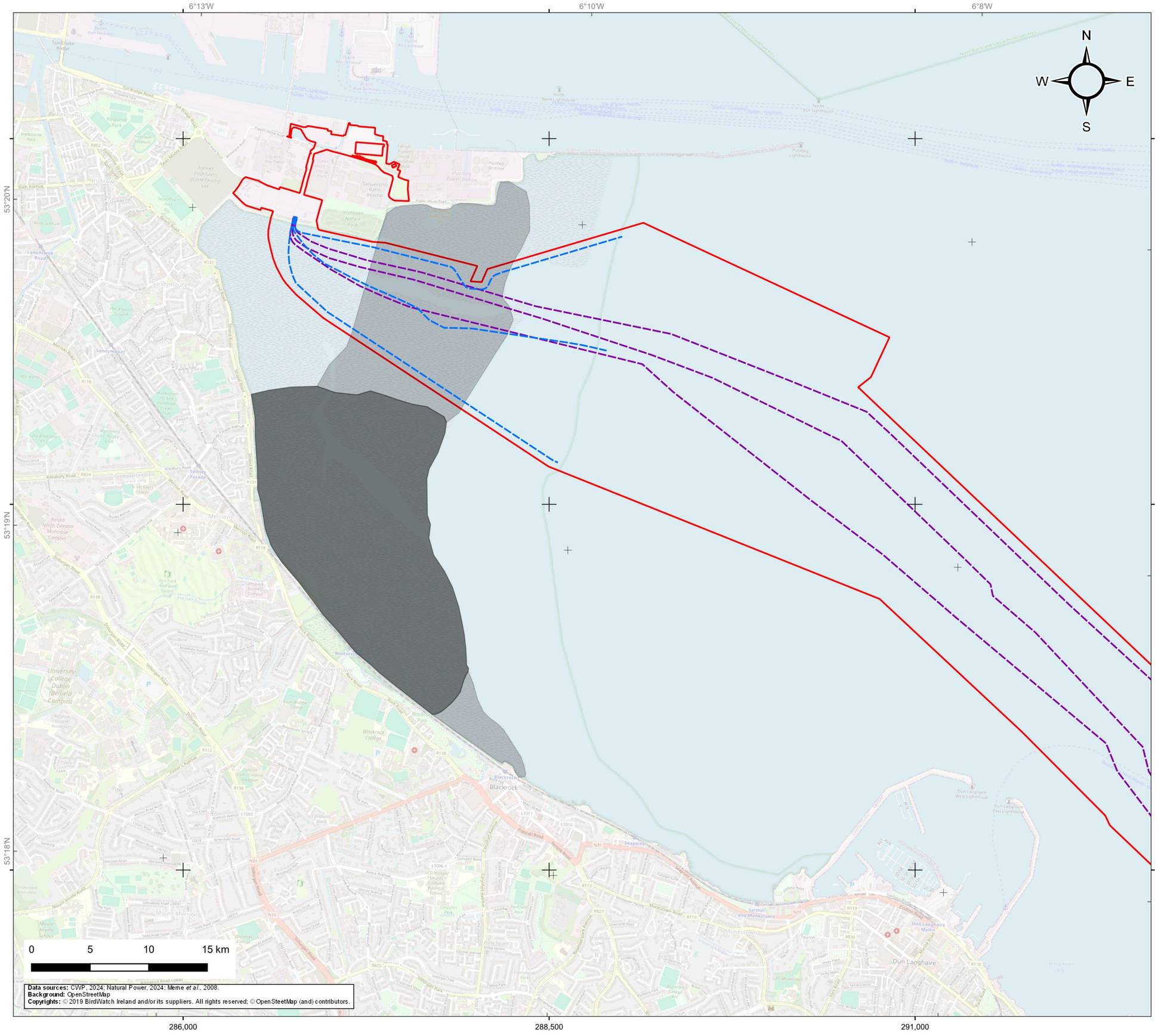
Contractor: natural power www.naturalpower.com

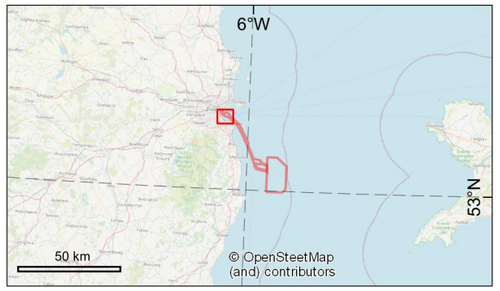
Figure 2.1
Distribution of post-breeding tern roosting locations recorded during baseline surveys (2021 – 22) relative to intertidal cable route scenarios

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1692

Internal descriptive code:	*Size:*	*CRS:*
DU BAY - PAB..OECs.3PB.Opt8..OECs.3PB.Opt8.INTERTIDAL.ALTER.ALIGN - ROOST.TERNs.STERNA.SANDWICH - (NIS.Vol.05.a.Sec.02.FIG.01)	*Scale:* 1:25,000	EPSG 25830

Rev.	*Updates*	*Date*	*By*	*Chk'd*	*App'd*
A	Final version	2024/08/06	AC	FM/EA	CP





Legend

- Planning Application Boundary (PAB)
- Offshore export cable
- Offshore export cable – alternative alignment

Indicative locations of core and peripheral areas used by roosting terns as described in Merne et al. (2008)

- Core roosting area
- Peripheral roosting area

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 2.2
Distribution of post-breeding tern roosting locations recorded during previous monitoring (Merne et al., 2008 data)

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1693

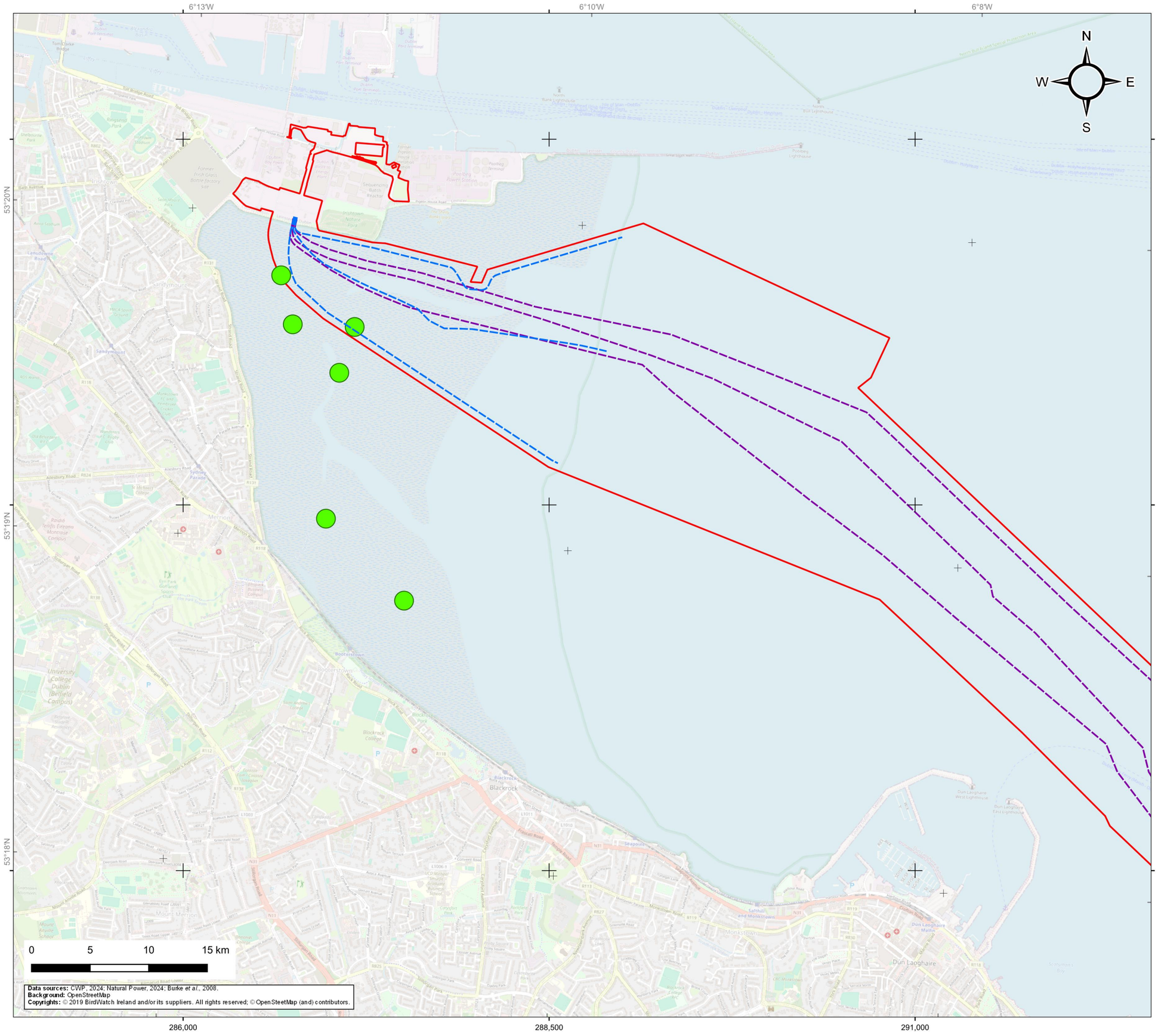
Internal descriptive code: DU.BAY - PAB..OECs.3PB.Opt8..OECs.3PB.Opt8.INTERTIDAL.ALTER.ALIGN - TRAs.2008 - (NIS Vol.05.a.Sec.02.FIG.02)

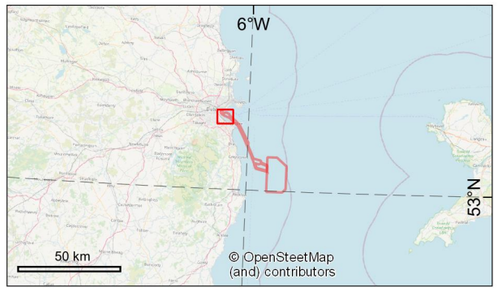
Size: A3

Scale: 1:25,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
A	Final version	2024/08/06	AC	FM/EA	CP





Legend

- Planning Application Boundary (PAB)
- Offshore export cable
- Offshore export cable – alternative alignment
- Area used by roosting terns 2017 Burke et al. (2018)

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 2.3
Distribution of post-breeding tern roosting locations recorded during previous monitoring (Burke et al., 2018 data)

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1694

Internal descriptive code: DU.BAY - PAB..OECs.3PB.Opt8..OECs.3PB.Opt8.INTERTIDAL.ALTER. ALIGN - TRPs.2018 - (INIS.Vol.05.a.Sec.02.FIG.03)

Size: A3

Scale: 1:25,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
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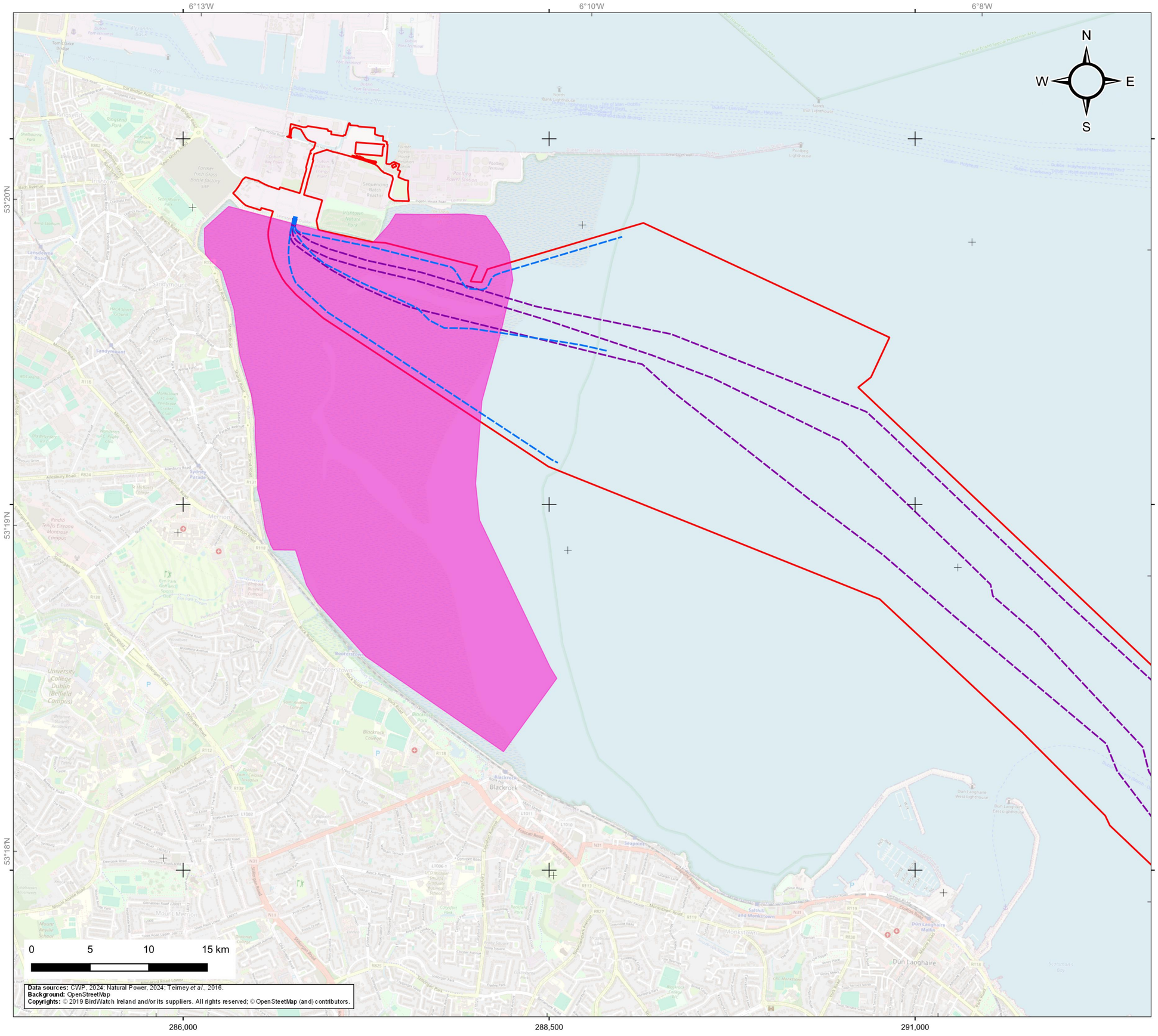
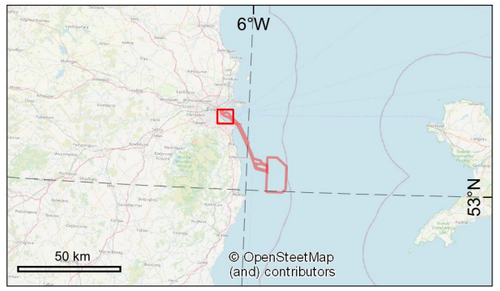




Legend

- Planning Application Boundary (PAB)
- Offshore export cable
- Offshore export cable – alternative alignment
- Area used by roosting terns 2013–2016 Teirney et al. (2016)

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 2.4
Distribution of post-breeding tern roosting locations recorded during previous monitoring (Tierney et al., 2016 data)

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1695

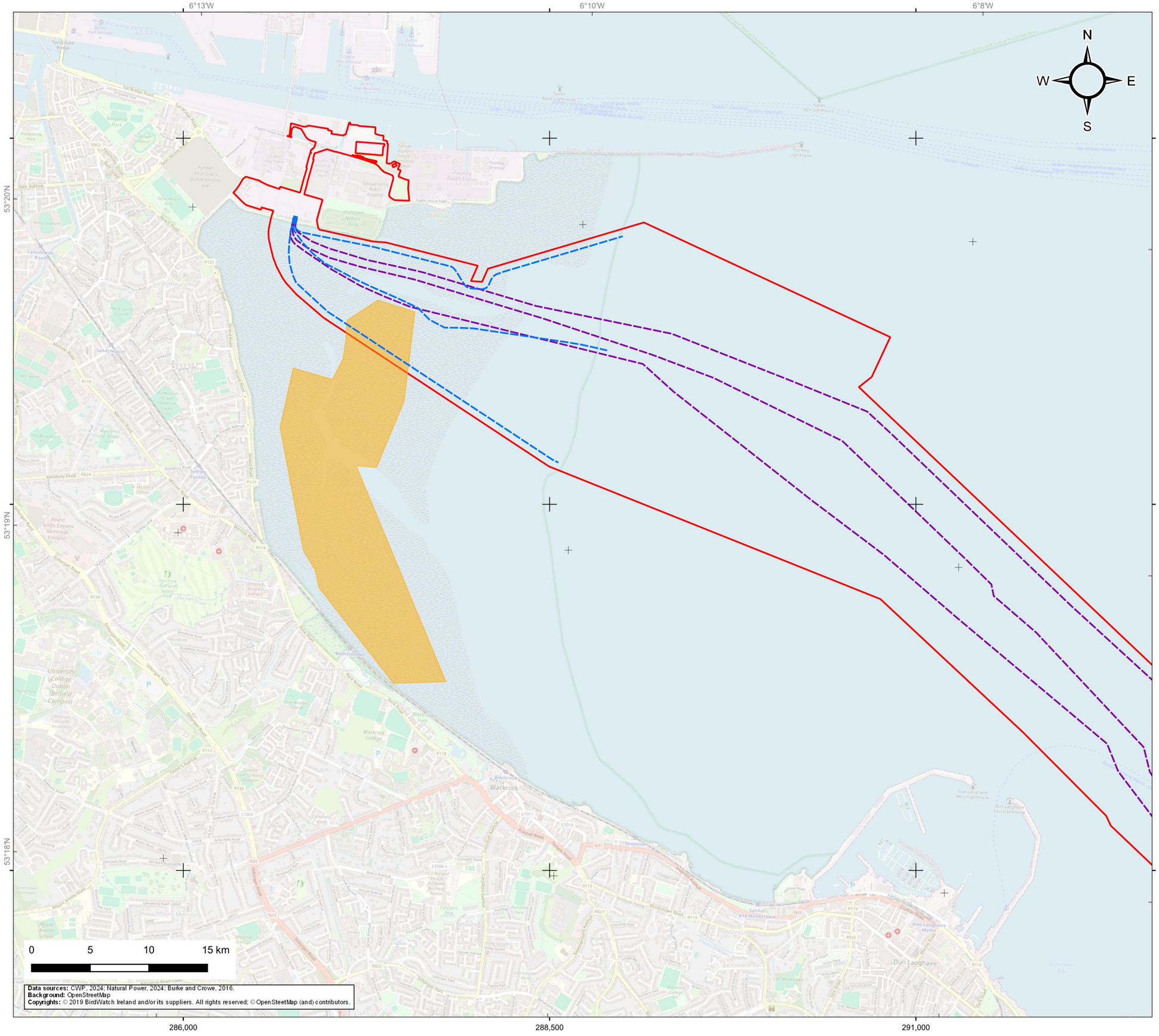
Internal descriptive code: DU.BAY - PAB..OECs.3PB.Opt8..OECs.3PB.Opt8.INTERTIDAL.ALTER. ALIGN - TRA.2013.2016 - (NIS.Vol.05.a.Sec.02.FIG.04)

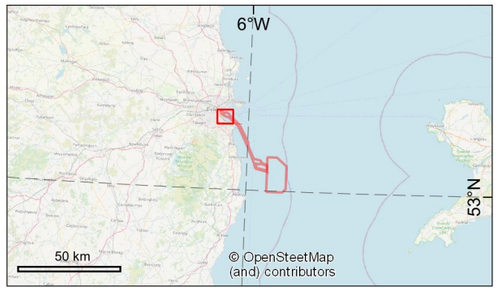
Size: A3

Scale: 1:25,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
A	Final version	2024/08/06	AC	FM/EA	CP





Legend

- Planning Application Boundary (PAB)
- Offshore export cable
- Offshore export cable – alternative alignment
- Area used by roosting terns 2016 Burke and Crowe (2016)

codling wind park

Project: Codling Wind Park

Contractor: natural power www.naturalpower.com

Figure 2.5
Distribution of post-breeding tern roosting locations recorded during previous monitoring (Burke and Crowe et al., 2016 data)

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1696

Internal descriptive code: DU.BAY - PAB..OECs.3PB.Opt8..OECs.3PB.Opt8.INTERTIDAL.ALTER. ALIGN - TRA.2016 - (NIS.Vol.05.a.Sec.02.FIG.05)

Size: A3

Scale: 1:25,000

CRS: EPSG 25830

Rev.	Updates	Date	By	Chk'd	App'd
A	Final version	2024/08/06	AC	FM/EA	CP

45. This comparison of tern roosting locations and cable route infrastructure indicates that, should cable route installation activities be undertaken during periods where roosting terns occupy roost sites, whilst there is uncertainty on the magnitude of the impact, there is the potential for disturbance impacts to large or very large proportions of large or very large numbers of roosting individuals within South Dublin Bay and River Tolka Estuary SPA.

46. As such, despite the limited duration of potential acoustic and visual disturbance impacts, there is assessed to be the potential for AESI to result from such activities to the common tern SCI of the SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-1**, above.

Proposed mitigation

47. As intertidal habitats within South Dublin Bay are primarily used by *Sterna* tern species during their post-breeding migration periods (mid-July to late-September) as nocturnal roosting areas, additional mitigation in the form of daily temporal restrictions (during the mid-July to late August period) is considered to be effective to ensure no AESI to the common tern SCI of the SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-1**, above.

48. Full details of this daily temporal restriction additional mitigation are as follows:

- No construction phase cable route installation or associated activities, including preparatory works, will be undertaken between one hour prior to sunset and the following sunrise within the South Dublin Bay area during the period of mid-July to August, inclusive; and
- This area corresponds with the extent of intertidal habitat (areas between Mean Low Water Springs (MLWS) and Mean High Water Springs (MHWS) within the South Dublin Bay part of the South Dublin Bay and River Tolka Estuary SPA.

Residual impacts

49. With the daily temporary restrictions applied during the post-breeding period between mid-July to August, inclusive, potential project-only disturbance and displacement impacts are assessed as follows:

50. Acoustic stimuli associated with any given piling event within the period of April to August, inclusive, and during daylight hours (from sunrise until approximately one hour before sunset (Tierney et al., 2016), between mid-July and August, inclusive), will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within the South Dublin Bay and River Tolka Estuary SPA (up to 0.79 individuals where the greatest extent of mobile construction activities (i.e., Alternative Alignment for the purposes of Modelling scenario) are implemented). This represents up to 1.00% of the average number of *Sterna* terns present within the South Dublin Bay Section of the South Dublin Bay and River Tolka Estuary SPA during diurnal baseline surveys between April and August, inclusive (79.27 individuals), up to 0.08% of the SPA common tern breeding population (988 individuals – 2016 count, SMP 2023) and 0.01% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013–2018 (7,364 individuals - see Table 3.4 in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

51. Visual stimuli associated with intertidal cable route installation activities within this period, will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within the South Dublin Bay and River Tolka Estuary SPA (up to 7.47 individuals for the most impactful cable laying route selection). This represents a up to 9.42% of the average number of *Sterna* terns present within the South Dublin Bay Section of the South Dublin Bay and River Tolka Estuary SPA during diurnal baseline surveys between April and August, inclusive (79.27 individuals), up to 0.76% of the SPA common tern breeding population (988 individuals – 2016 count, SMP 2023) and 0.10% of the

mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013–2018 (7,364 individuals - see **Table 3.4** in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

52. With the implementation of mitigation as outlined above, given the very limited number of individuals potentially experiencing disturbance in relation to construction phase activities within intertidal areas of South Dublin and River Tolka Estuary SPA, there is no potential for AESI to result from such activities to the common tern SCI of the SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-1**, above.

Onshore infrastructure

Project-only assessment

53. This species has been assessed as being at risk from disturbance and displacement during construction within the onshore development area. One common tern breeding colony was recorded during onshore surveys near to the onshore substation area on a mooring dolphin owned by the Electricity Supply Board (ESB), which is associated with the South Dublin Bay and River Tolka Estuary SPA. The established common tern colony occurs approximately 250 m to the northeast of the onshore substation area during the breeding season. According to Goodship and Furness (2022), this species is assessed as having medium sensitivity to human disturbance at breeding colonies and suggest a 200 m buffer zone around colonies to protect the species from pedestrian disturbance, but that a larger buffer may be required if terns are not habituated to disturbance or if there is likely to be aerial disturbance.

54. It is important to note that this colony, near the onshore substation area, is located within Dublin Port, which is a busy shipping and industrial area. A report prepared by ALCnature on behalf of CWP Project (see **Appendix 10.9** of the EIAR), was commissioned to determine the current disturbance tolerance of the breeding terns near to the proposed onshore substation. The study recreated potential construction disturbance / displacement included experimental disturbances in the form of the movement of personnel and machinery, creating light and moderate noise, within the onshore substation site. The results concluded that the terns within this study area have habituated to high levels of background disturbance and show low levels of disturbance to several current forms of more severe sporadic disturbance events, such as boats, traffic, predators, humans and aircraft.

55. In this context based on the distance of the onshore substation construction works to the breeding common tern colony and the habituation of the species to activities within Dublin Bay, the scale of disturbance and displacement effects on common tern within the breeding colony is considered to be negligible. The level of impact is not considered capable of resulting in a significant decline in breeding population abundance, productivity rate, passage population, and/or distribution of breeding colonies and roosting areas. Accordingly, the CWP Project will not impede the overall objective of maintaining the favourable conservation condition of common tern in the SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the South Dublin Bay and River Tolka Estuary SPA.

56. Despite this and the common tern's tolerance to some levels of disturbance, the CWP project proposes mitigation on a precautionary basis to manage the potential disturbance and displacement impacts to the breeding common tern SCI during the construction phase associated with the onshore substation development.

Proposed Mitigation

57. Mitigation measures applicable to terns have been detailed in a tern disturbance report prepared by ALCnature (**Appendix 10.9** of the EIAR), a summary of these mitigation measures includes the following:

Restriction period

58. The period from 1 May to 15 August shall be defined as the tern breeding season and restrictions will apply as detailed below. The latter date may require amendment subject to progress of the breeding season and this should be monitored as the season progresses.

Visual screening

59. A solid screen (hoarding) around the periphery of the construction works, will be erected and maintained to a height of 2.5 m. Screening will be in place during the period of 1 May to 15 August. Work above hoarding height (including movement and noise of machinery or personnel) and within 40 m, will be limited to periods of <5 minutes per hour.

Noise & lighting limits

60. High noise and vibration activities (e.g., piling) will be restricted to outside a 75 m buffer zone of the tern colony between 1 May and 15 August.

61. There will be no lighting to the exterior of hoarding in line of sight of the tern colony between 1 May and 15 August, and no works will occur in hours of darkness between 1 May and 15 August.

Monitoring and response

62. Monitoring of responses exhibited by the tern colony shall be carried out in accordance with a structured plan throughout the breeding season, in order to enable appropriate responses to disturbance events (i.e., enabling or restricting works subject to response observed).

Special measures during fledging period

63. During the period when chicks are fledging and may leave the colony platform (typically July to mid-August), birds may move to shoreline areas to seek dry perches. During this time, there is a risk of tern chicks entering the onshore development area and adults defending chicks by attacking personnel. The potential loss of chicks through exclusion of adults or through injury is apparent and during this period a trained ecologist will be on hand to locate and capture chicks in close proximity to the work areas and relocate them to suitable safe areas to avoid these issues.

Residual impacts

64. The CWP Project will not impede the overall objective of maintaining the favourable conservation condition of common tern in the SPA. In light of these factors, and in the absence of mitigation measure, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the South Dublin Bay and River Tolka Estuary SPA.

65. However, the addition of additional mitigation measures will further reduce the impact of the CWP Project as a result from disturbance and displacement during the construction phase at the onshore area in relation to the Conservation Objectives and attributes and targets for this SCI within the South Dublin Bay and River Tolka Estuary SPA.

Project-only effect on site integrity conclusion for impact

66. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**, above. With regards to direct effects on disturbance and displacement impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Construction phase impact 3 – Changes in prey availability

Array site

Project-only assessment

67. As the array site does not overlap this SPA and the SPA is beyond the range in which prey species may experience potential impacts from construction phase works, potential changes in prey availability impacts will occur entirely outside of the SPA, i.e., all impacts assessed here relate to prey species within ex situ habitats which may support this SPA SCI.

68. Common tern depredates a range of fish species, including gadoids, sandeels and clupeids. Of its key prey species groups, gadoids and clupeids are anticipated to be most impacted by underwater noise during the construction phase. Construction phase activities within the array site which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Breeding population abundance (no significant decline);
- Productivity rate (no significant decline);
- Passage population (no significant decline); and
- Prey biomass available (so significant decline).

69. These Conservation Objective attributes have the potential to be impacted through injury, mortality or TTS impacts on prey species, primarily during piling operations, they may also be impacted by Increased suspended sediment impacts to seabird prey species, primarily from dredging and trenching.

70. Injury or mortality for prey species may occur for individuals occurring very close to high noise level construction activities (primarily piling operations), however such effects will be localised and will be minimised by ‘soft start’ procedures allowing mobile prey individuals to vacate very high noise level areas, prior to noise levels resulting in injury or mortality being reached. TTS impacts may result from

exposure of prey species to lower underwater noise levels and consequently are experienced over a larger area than direct injury/mortality impacts.

71. Mortality or injury-inducing underwater noise impacts to these prey species groups (primarily in relation to pile driving for WTG and OSS foundation installation over up to 262.5 days, over a period of up to 3 years) are calculated to occur within only very low proportions of theoretical common tern breeding season foraging areas around any given colony: less than 2.99% (mortality) and 8.27% (injury) of foraging areas estimated to be impacted for colonies within foraging range of the array site (mean-maximum + 1. S.D. = 26.9 km, Woodward et al., 2019).

72. TTS impacts to prey species are considered to be very temporary in nature, and as such will have very limited potential to result in population-level consequences to their seabird predators.

73. The spatial extent of temporarily disturbed areas of benthic habitat during construction phase activities are also assessed to be of negligible size in relation to seabird breeding and non-breeding season range extents. For example, the maximum potential extent of removed or altered benthic habitat within the array site is 6.30 km^2, which equates to 0.55% of foraging areas available to colonies within foraging range of the array site (mean-maximum + 1. S.D. = 26.9 km, Woodward et al., 2019).

74. It is expected that prey species likely to occur in the vicinity of construction activities within the array site will be largely unaffected by resultant low-level temporary increases in suspended sediment concentration, as the concentrations are likely to be within the range of natural variability tolerated by these species and will reduce to background concentrations within a very short period.

75. Consequently, there is assessed to be no potential for AESI to result from changes in prey availability during construction phase activities within the array site in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-1**, above.

Proposed mitigation

76. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

77. As per project-only assessment, above.

OECC

Project-only assessment

78. Common tern depredates a range of fish species, including gadoids, sandeels and clupeids. Of its key prey species groups, gadoids and clupeids are anticipated to be most impacted by underwater noise during the construction phase. Construction phase activities within the array site which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Breeding population abundance (no significant decline);
- Productivity rate (no significant decline);
- Passage population (no significant decline); and
- Prey biomass available (so significant decline).

79. These Conservation Objective attributes have the potential to be impacted through increased suspended sediment impacts to seabird prey species, primarily from dredging and trenching.

80. Underwater noise impacts to prey species are anticipated to very limited, as no pile driving activities are proposed in relation to the installation of the export cable within OECC, with high energy underwater noise sources limited to the potential treatment of a small number of Unexploded Ordinance (UXO) (fewer than ten).

81. The spatial extent of temporarily disturbed areas of benthic habitat during construction phase activities within the OECC (up to 5.63 km^2) is also assessed to be of negligible size in relation to this SCI's breeding and non-breeding season range extents. Within these areas, benthic communities are typically resilient to localised habitat disturbance, demonstrating high or very high levels of recoverability (i.e., within weeks or months).

82. It is expected that prey species likely to occur in the vicinity of construction activities within the OECC will be largely unaffected by resultant low-level temporary increases in suspended sediment concentration, as the concentrations are likely to be within the range of natural variability tolerated by these species and will reduce to background concentrations within a very short period.

83. Consequently, there is assessed to be no potential for AESI to result from changes in prey availability during construction phase activities within the OECC in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-1**, above.

Proposed mitigation

84. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

85. As per project only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

86. Common tern depredates a range of fish species, including gadoids, sandeels and clupeids. Of its key prey species groups, gadoids and clupeids are anticipated to be most impacted by underwater noise during the construction phase. Construction phase activities within the OECC intertidal landfall area which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Breeding population abundance (no significant decline);
- Productivity rate (no significant decline);
- Passage population (no significant decline); and
- Prey biomass available (so significant decline).

87. These Conservation Objective attributes have the potential to be impacted through a reduction in prey availability due to:

    a. Increased suspended sediment levels may temporarily alter the distribution of fish and mobile invertebrate species should they respond to avoid areas of altered water column condition.

b. Alteration of habitats which support prey species may reduce the capacity of those habitats to hold or produce prey species, thereby reducing the abundance of prey available to foraging seabirds within and around impacted areas.

88. The extent of intertidal areas (between MLWS and MHWS) within South Dublin Bay is approximately 21.94 km^2, within which approximately 0.16 km^2 (0.72%) are predicted to be disturbed during landfall cable installation (see **Volume 2, Chapter 4: Project Description, Section 4.8**). As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during construction activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

89. It is therefore considered that there is no potential for AESI to result from changes in prey availability during construction phase activities within the OECC intertidal landfall area in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-1**, above.

Proposed mitigation

90. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

91. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

92. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**, above. With regards to changes in prey availability during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and Maintenance Phase Impacts

Operation and maintenance phase impact 1 – Direct effects on habitat

Array site

Project-only assessment

93. With regards to the array site, relevant operation and maintenance phase direct effects on habitat relate to the occupation of sea surface areas by the footprint of operational infrastructure and therefore become unavailable for use by seabird SCIs to undertake non-foraging behaviours. As the array site does not overlap this SPA, all direct effects on habitat will occur entirely outside of the SPA, i.e. all direct effects assessed here relate to ex situ habitats which may support the common tern SCI of South Dublin Bay and River Tolka Estuary SPA.

94. As the operation and maintenance phase progresses through its planned duration of 25 years, the above sea level spatial extent of infrastructure will at no point exceed 0.005 km^2 within the array site

(i.e. combined sea level area of all WTGs and OSSs). This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for the common tern SCI of South Dublin Bay and River Tolka Estuary SPA:

- Breeding population abundance (no significant decline); and
- Passage population (no significant decline).

95. In relation to these Conservation Objective attributes, the presence of built infrastructure following the removal of previously available habitat may reduce the marine areas in which individuals can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of the spatial footprint of operational infrastructure within the array site may affect the energetic costs of non-foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

96. Despite the above potential pathways to impact, these direct effects on habitat do not affect any area of the SPA (and hence do not affect the distribution of foraging, roosting or breeding habitat of this SCI within the SPA). Further, the area of habitat loss represents a negligible proportion of sea area within the foraging range (mean-maximum + 1. S.D. = 26.9 km, Woodward et al., 2019) of common tern breeding within South Dublin Bay and River Tolka Estuary SPA and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

97. In the context of the extent of available habitat within foraging range of the SPA, and the negligible proportion that will be occupied by operational infrastructure, the scale of direct effects on habitat within the array site is considered to be negligible. In particular, the reduction in marine areas in which to undertake non-foraging behaviours, or requirement to use alternative areas for non-foraging behaviours, is not expected to give rise to energetic costs of non-foraging behaviours in such a way as to affect the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the breeding population abundance of this SPA SCI.

98. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of common tern in the SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the South Dublin Bay and River Tolka Estuary SPA.

Proposed mitigation

99. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

100. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

101. Impacts considered to be direct effects on habitat may arise as a consequence of maintenance activities which temporarily remove or alter areas of intertidal habitat which are utilised by this SCI. Cable landfall duct maintenance activities and potential cable repair works during the operation and maintenance phase within South Dublin Bay have the potential to alter areas of intertidal habitat such that they become temporarily unavailable to common tern connected with South Dublin Bay and River Tolka Estuary SPA, which may otherwise utilise those areas for non-foraging behaviours.

102. The non-foraging capacity in which the common tern SCI is considered primarily to use the intertidal habitat within South Dublin Bay is for roosting aggregations, especially during the post-breeding period (mid-July to early September).

103. Direct effects on intertidal habitat have the potential to impact on the following Conservation Objective attributes and targets for the common tern SCI of South Dublin Bay and River Tolka Estuary SPA:

- Breeding population abundance (no significant decline);
- Passage population (no significant decline); and
- Distribution: roosting areas (no significant decline).

104. In relation to these Conservation Objective attributes, operation and maintenance of the CWP Project OECC intertidal landfall may result in temporary reductions in the spatial extent of the intertidal areas within South Dublin Bay in which individuals from South Dublin Bay and River Tolka Estuary SPA can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of operation and maintenance phase activities within the OECC intertidal landfall may directly affect demographic parameters (for example, use of alternative roosting areas may increase vulnerability to predation and reduce survival rates), or may affect the energetic costs of non-foraging behaviours through increased occupancy of sub-optimal area and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

105. Despite the above potential pathways to impact, as the spatial extent of any temporary direct effects on intertidal habitats from maintenance activities will be, at most extremely localised, should extraction and reinstatement of intertidal areas be required, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the breeding or passage population abundance of the common tern SCI of South Dublin Bay and River Tolka Estuary SPA. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of the common tern SCI of South Dublin Bay and River Tolka Estuary SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to South Dublin Bay and River Tolka Estuary SPA.

Proposed mitigation

106. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

107. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

108. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**, above. With regards to direct effects to habitat during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance phase impact 2 – Disturbance and displacement

OECC (Intertidal landfall)

Project-only assessment

109. Disturbance and displacement have the potential to impact on the following Conservation Objective attributes and targets for the common tern SCI of South Dublin Bay and River Tolka Estuary SPA:

- Breeding population abundance (no significant decline);
- Productivity rate (no significant decline);
- Passage population (no significant decline);
- Distribution: breeding colonies (no significant decline);
- Distribution: roosting areas (no significant decline);
- Barriers to connectivity (no significant decline);
- Disturbance at the breeding site (human activities should occur at levels that do not adversely affect the breeding common tern population); and
- Disturbance at the roosting site (human activities should occur at levels that do not adversely affect the numbers of common tern among the post-breeding aggregation of terns).

110. Following installation of the OECC through the intertidal zone from the transition zone to the Transition Joint Bays (TJBs) at the landfall location, the operational nature of any buried infrastructure within South Dublin Bay and River Tolka Estuary SPA is passive. Any routine visual inspection of the OECC does not extend to buried infrastructure within the SPA.

111. It is possible that unplanned maintenance may be required on buried infrastructure within the SPA during the operational phase of the project. In relation to these Conservation Objective attributes, any such unplanned maintenance activities have the potential to cause disturbance and displacement to common tern within the vicinity of the impacted area. It is considered, however, that any unplanned maintenance activities on buried infrastructure within South Dublin Bay during the operational phase of the project would be restricted in terms of their frequency, temporal duration and spatial scale, resulting in discrete areas of a visual disturbance of ~250m radius.

112. Given the extent of intertidal habitat available to the SCI, the short temporal duration of any unplanned maintenance activities and the passive nature of the operation of buried infrastructure within South Dublin Bay and River Tolka Estuary SPA, it is considered such that there is no potential for AESI to the SCI as a result of disturbance and displacement impacts during the operation and maintenance phase around the OECC intertidal landfall in relation to the Conservation Objectives, attributes and targets outlined in **Table 2-1**, above.

Proposed mitigation

113. No specific mitigation is proposed, or required, in respect of disturbance and displacement during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

114. As per project-only assessment, above.

Onshore infrastructure

Project-only assessment

115. Following installation of the substation and associated onshore landfall infrastructure, the operational nature of infrastructure in the vicinity of breeding common tern colonies (including the ESB pontoon which forms part of the South Dublin Bay and River Tolka Estuary SPA) is passive.

116. It is possible that unplanned maintenance may be required on infrastructure during the operational phase of the project, and that such activities may occur within 200 m of breeding common terns. It is considered, however, that routine activities during the operational phase of the project would be no greater in magnitude than existing anthropogenic activities to which breeding terns are already habituated.

117. Given short temporal duration of any unplanned maintenance activities and that routine operational activities are considered to be at levels to which breeding terns are already habituated, it is considered such that there is no potential for AESI to this SCI as a result of disturbance and displacement impacts during the operation and maintenance phase around the substation and associated onshore infrastructure, in relation to the Conservation Objectives, attributes and targets outlined in **Table 2-1** above.

Proposed mitigation

118. No specific mitigation is proposed, or required, in respect of disturbance and displacement during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

119. As per project only assessment, above

Project-only effect on site integrity conclusion for impact

120. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**, above. With regards to disturbance and displacement during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance phase impact 3 – Changes in prey availability

Array site

Project-only assessment

121. As the array site does not overlap this SPA and the SPA is beyond the range in which prey species may experience potential impacts from operation and maintenance phase works, potential changes in prey availability impacts will occur entirely outside of the SPA, i.e., all impacts assessed here relate to prey species within ex situ habitats which may support this SPA SCI.

122. Common tern depredates a range of fish species, including gadoids, sandeels and clupeids. Of its key prey species groups, gadoids and clupeids are anticipated to be most impacted by underwater noise. Operation and maintenance phase activities within the Array site which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Breeding population abundance (no significant decline);
- Productivity rate (no significant decline);
- Passage population (no significant decline); and
- Prey biomass available (so significant decline).

123. In relation to these Conservation Objective attributes, maintenance activities during the operational phase of the CWP Project array site may impact common tern prey species through underwater noise effects, increases to suspended sediment concentrations, removal or alteration of important benthic habitats for those prey species, or electromagnetic field effects affecting prey species distributions around electrical infrastructure. In relation to these Conservation Objective attributes, maintenance activities during the operational phase of the array site may impact common tern prey species through underwater noise effects, increases to suspended sediment concentrations, removal or alteration of important benthic habitats for those prey species, or electromagnetic field effects affecting prey species distributions around electrical infrastructure. Should these impacts on prey species reduce the availability of those prey species to foraging common terns, this may result in effects to the demographic parameters, and resultant population dynamics, of this SCI through processes such as increased energetic consequences of foraging reducing individual condition and survival or productivity rates, or reduced provisioning rates to offspring reducing productivity rates. These potential consequences may compromise the ability of the SCI to maintain its population, with prey availability changes potentially resulting in there being insufficient habitat to support the SCI's population on a long-term basis.

124. As operational phase activities within the array site will not include piling works or any other very high energy underwater noise inducing activities, and operational noise impact magnitudes to all potential prey species are assessed to be very low, there is not considered to be a pathway for operation and maintenance phase underwater noise impacts to have the potential to cause perceptible changes to prey availability in such a way that could impact this SCI.

125. Similarly, as operational phase activities within the array site do not routinely require disturbance of the seabed (in the form of trenching or dredging activities) except within localised areas in which this is necessary to facilitate repairs, increased Suspended Sediment Concentration (SSC) levels, are considered to occur only potentially infrequently and locally during the operational phase and there is no perceptible pathway for this impact to have the potential to cause changes to prey availability during the operational phase in such a way that could impact this SCI.

126. Key fish species, upon which common tern predate, may experience the loss of up to 0.49 km^2 of previously available benthic habitat within the array site as a result of occupancy of the seabed by

infrastructure during the operation and maintenance phase of the CWP Project. The spatial extent of such prey species habitat loss is, however, considered to be of negligible size in relation to this SCI's breeding and non-breeding season range extents.

127. During the operation and maintenance phase, one additional potential impact to seabird receptor prey species which does not occur during the construction phase is considered, namely electromagnetic field (EMF) effects, associated with electricity passing along infrastructure cables. Any effects on fish are anticipated to occur within the immediate vicinity of the cable and effect levels are likely to be low in relation to background levels associated with the Earth's magnetic field. The magnitude of such impacts to potentially sensitive fish species are assessed as being very low. Consequently, there is not considered to be a pathway for operation and maintenance phase EMF impacts to have the potential to cause impacts to prey availability in such a way that could impact this SCI.

128. Despite the above potential pathway to impact in the form of benthic habitat loss, the area in which impacts to prey species availability may occur represents a negligible proportion of sea area within the foraging range of common tern breeding within South Dublin Bay and River Tolka Estuary (mean-maximum + 1. S.D. = 26.9 km, Woodward et al., 2019) and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

129. In the context of the extent of available habitat within foraging range of the SPA, the negligible proportion of that habitat in which potential impacts to prey species may occur, and that potential impacts to prey species may be of limited (if any) demographic consequence to their seabird predators, the scale of changes in prey availability impacts associated with operation and maintenance phase activities within the array site is considered to be negligible.

130. In particular, potential changes to prey availability resultant from operation and maintenance phase activities within the array site are not expected to perceptibly increase the energetic costs of foraging, or lead to reductions in offspring provisioning rates for the common tern SCI of South Dublin Bay and River Tolka Estuary in such a way as to affect demographic parameters. Accordingly, the level of impact is not considered capable of altering the availability of prey species in such a way as to result in a significant decline in the breeding population abundance of this SPA SCI.

131. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of this SPA SCI. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA.

Proposed mitigation

132. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

133. As per project only assessment, above.

OECC

Project-only assessment

134. Common tern depredates a range of fish species, including gadoids, sandeels and clupeids. Of its key prey species groups, gadoids and clupeids are anticipated to be most impacted by underwater noise. Operation and maintenance phase activities within the OECC which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Breeding population abundance (no significant decline);
- Productivity rate (no significant decline);
- Passage population (no significant decline); and
- Prey biomass available (so significant decline).

135. In relation to these Conservation Objective attributes, maintenance activities during the operational phase of the OECC may impact common tern prey species through underwater noise effects, increases to suspended sediment concentrations, removal or alteration of important benthic habitats for those prey species, or electromagnetic field effects affecting prey species distributions around electrical infrastructure. Should these impacts on prey species reduce the availability of those prey species to foraging common tern, this may result in effects to the demographic parameters, and resultant population dynamics, of this SCI through processes such as increased energetic consequences of foraging reducing individual condition and survival or productivity rates, or reduced provisioning rates to offspring reducing productivity rates. These potential consequences may compromise the ability of the SCI to maintain its population, with prey availability changes potentially resulting in there being insufficient habitat to support the SCI's population on a long-term basis.

136. As operational phase activities within the OECC will not include piling works or any other very high energy underwater noise inducing activities, and operational noise impact magnitudes to all potential prey species are assessed to be very low, there is not considered to be a pathway for operation and maintenance phase underwater noise impacts to have the potential to cause perceptible changes to prey availability in such a way that could impact this SCI.

137. Similarly, as operational phase activities within the OECC do not routinely require disturbance of the seabed (in the form of trenching or dredging activities) except within localised areas in which this is necessary to facilitate repairs, increased SSC levels, are considered to occur only potentially infrequently and locally during the operational phase and there is no perceptible pathway for this impact to have the potential to cause changes to prey availability during the operational phase in such a way that could impact this SCI.

138. Key fish species, upon which common tern depredate, may experience the loss of up 0.11 km^2 of previously available benthic habitat within the OECC as a result of alteration of the seabed during the operation and maintenance phase of the CWP Project. The areas which may experience long-term alteration of any benthic habitats which have the potential to support populations of key seabird prey species constitute only a very small proportion (<1%) of the extent of common tern foraging areas.

139. During the operation and maintenance phase, one additional potential impact to seabird receptor prey species which does not occur during the construction phase is considered, namely EMF effects, associated with electricity passing along infrastructure cables. Any effects on fish are anticipated to occur within the immediate vicinity of the cable and effect levels are likely to be low in relation to background levels associated with the Earth's magnetic field. The magnitude of such impacts to potentially sensitive fish species are assessed as being very low. Consequently, there is not considered to be a pathway for operation and maintenance phase EMF impacts to have the potential to cause impacts to prey availability in such a way that could impact this SCI.

140. Despite the above potential pathway to impact in the form of benthic habitat loss, the area in which impacts to prey species availability may occur represents a negligible proportion of sea area within the foraging range of common tern breeding within this SPA (mean-maximum + 1. S.D. = 26.9 km, Woodward et al., 2019) and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

141. In the context of the extent of available habitat within foraging range of the SPA, the negligible proportion of that habitat in which potential impacts to prey species may occur, and that potential impacts to prey species may be of limited (if any) demographic consequence to their seabird predators, the scale of changes in prey availability impacts associated with operation and maintenance phase activities within the array site is considered to be negligible.

142. In particular, potential changes to prey availability resultant from operation and maintenance phase activities within the array site are not expected to perceptibly increase the energetic costs of foraging, or lead to reductions in offspring provisioning rates for this SPA SCI in such a way as to affect demographic parameters. Accordingly, the level of impact is not considered capable of altering the availability of common tern prey species in such a way as to result in a significant decline in the breeding population abundance of this SPA SCI.

143. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of this SPA SCI. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA.

Proposed mitigation

144. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

145. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

146. Common tern depredates a range of fish species, including gadoids, sandeels and clupeids. Of its key prey species groups, gadoids and clupeids are anticipated to be most impacted by underwater noise during the operation and maintenance phase. Operation and maintenance phase activities within the OECC intertidal landfall area which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Breeding population abundance (no significant decline);
- Productivity rate (no significant decline);
- Passage population (no significant decline); and
- Prey biomass available (so significant decline).

147. Following installation of the OECC through the intertidal zone from the transition zone to the TJBs at the landfall location, the operational nature of any buried infrastructure within South Dublin Bay and River Tolka Estuary SPA is passive. Any routine visual inspection of the OECC does not extend to buried infrastructure within the SPA.

148. It is possible that unplanned maintenance may be required on buried infrastructure within the SPA during the operational phase of the project. In relation to these Conservation Objective attributes any such unplanned maintenance activities have the potential to cause disturbance and displacement to common tern within the vicinity of the impacted area. It is considered, however, that any unplanned maintenance activities on buried infrastructure within South Dublin Bay during the operational phase of the project would be restricted in terms of their frequency, temporal duration and spatial scale.

149. The extent of intertidal areas (between MLWS and MHWS) within South Dublin Bay is approximately 21.94 km^2, within which approximately 0.16 km^2 (0.72%) are predicted to be disturbed during landfall cable installation (see **Chapter 4: Project Description; Section 4.8**). The scale of any maintenance to buried infrastructure carried out during the operation and maintenance phase will likely be considerably smaller than that during cable installation during the construction phase. As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during operation and maintenance activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

150. It is therefore considered that there is no potential for AESI to result from changes in prey availability during operation and maintenance phase activities within the OECC intertidal landfall area in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-1**, above.

Proposed mitigation

151. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

152. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

153. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**, above. With regards to changes in prey availability during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance impact 4 – Collision

Array site

Project-only assessment

154. During the operation and maintenance phase of the CWP Project the presence of operational WTGs within the array site may result in the mortality of this SPA SCI through the collision of individuals with turbine blades. Collision mortality has the potential to impact on the following Conservation Objective attribute and target for this SPA SCI:

- Breeding population abundance (no significant decline);

- Productivity rate (no significant decline);
- Passage population (no significant decline);

155. In relation to these Conservation Objective attributes, mortality resultant from collision with operational WTGs within the array site may directly affect the overall survival rate of this SPA SCI that could then impact population sizes. Furthermore, collision mortality may also adversely affect the overall productivity rate of this SPA SCI, through reductions to offspring provisioning rates and other parental care metrics.

156. Common tern which breed within the SPA (992 individuals – 2016 count, SMP) and common tern which use the SPA during the post-breeding period (a maximum count of 17,440 *Sterna* terns in attendance at post-breeding tern roost in South Dublin Bay in 2016 (Tierney et al., 2016; Burke and Crowe, 2016) is the largest aggregation recorded using the SPA – the majority of which are likely to have been common tern), may, however potentially collide with turbines during their return and post-breeding migrations. On this basis, potential collision impacts to the common tern breeding population of the SCI are assessed in **Table 2-2** and potential collision impacts to the common tern post-breeding aggregation population of the SCI are assessed in **Table 2-3** In the latter case, the conservative assumption is made that all of the maximum count of 17,440 *Sterna* terns in attendance at post-breeding tern roost in South Dublin Bay in 2016 were common tern, resulting in a maximum proportion of total collision risk being apportioned to the SPA.

157. Total bio-seasonal and total annual estimated common tern collision mortalities, as derived in **Technical Appendix 10.3: Collision Risk Modelling**[1] of the EIAR, are presented in **Table 2-2** and **Table 2-3**. In **Table 2-2**, these values are apportioned to South Dublin Bay and River Tolka Estuary SPA according to the apportioning ratios determined in **Appendix 3 Apportioning Impacts to SPAs** in Volume 7 of this NIS, on the basis of the breeding colony size of the SPA and common tern collision mortalities apportioned to the SPA in each bio-season and annually. In **Table 2-3** these values are apportioned to South Dublin Bay and River Tolka Estuary SPA on the basis of the maximum post-breeding aggregation size of the SPA and common tern collision mortalities apportioned to the SPA in each bio-season and annually.

158. Collision mortalities are presented in relation to Design Options A and B and Collision Risk Modelling (CRM) Band Option 2 models.

[1] Collision Risk Modelling within this Appendix is undertaken based on guidance prior to the publication of the 2024 *Joint advice note from the Statutory Nature Conservation Bodies (SNCBs) regarding bird collision risk modelling for offshore wind developments*. The parameters presented within the updated advice note do not materially alter the modelled values presented in **Appendix 10.3** and therefore the apportionment presented in **Appendix 3**, and conclusions based upon them.

Table 2-2: Total bio-seasonal and annual collision mortalities to common tern and mortalities apportioned to South Dublin Bay and River Tolka Estuary SPA in relation to SPA breeding population

	Design Option	CRM Band Option	Bio-season			Annual
			RM (Dec–Mar)	MFB (Apr–Aug)	PBM (Sep–Nov)	
Total impact	A	2	0.147	0.019	2.107	2.273
	B	2	0.129	0.017	1.887	2.033
Proportion of impact apportioned to SPA (in relation to SPA breeding population of 992 individuals)			1.34%	0.00% (No connectivity)	1.34%	
Impact to SPA	A	2	0.002	0.000	0.028	0.030
	B	2	0.002	0.000	0.025	0.027

Table 2-3: Total bio-seasonal and annual collision mortalities to common tern and mortalities apportioned to South Dublin Bay and River Tolka Estuary SPA in relation to SPA post-breeding aggregation population

	Design Option	CRM Band Option	Bio-season			Annual
			RM (Dec–Mar)	MFB (Apr–Aug)	PBM (Sep–Nov)	
Total Impact	A	2	0.147	0.019	2.107	2.273
	B	2	0.129	0.017	1.887	2.033
Proportion of impact apportioned to SPA (in relation to SPA post-breeding aggregation population of 17,440 individuals)			23.57%	0.00% (No connectivity)	23.57%	
Impact to SPA	A	2	0.035	0.000	0.497	0.531
	B	2	0.030	0.000	0.445	0.475

159. Increases to SPA breeding common tern mortality rates resultant from apportioned annual impacts are presented in **Table 2-4**. In this table, the most recent colony count from the SPA (2016 count - SMP, 2023), is used to estimate the average number of breeding adults from the SPA colony which die each year by multiplying by one minus common tern adult annual survival rate taken from Horswill and Robinson (2015), and apportioned mortality compared to this figure to determine the proportional increase to SPA mortality rates presented by additional collision mortality associated with the CWP Project.

160. Increases to SPA post-breeding aggregation common tern mortality rates resultant from apportioned annual impacts are presented in **Table 2-5**. In this table, the maximum post-breeding aggregation count (assumed to all be common tern for apportioning purposes) of 17,440 *Sterna* terns in attendance at the post-breeding tern roost in South Dublin Bay (Tierney et al., 2016; Burke and Crowe, 2016) is used to estimate the average number of individuals associated with the SPA which die each year by multiplying by one minus common tern overall annual survival rate calculated from Horswill and Robinson (2015), (shown in **Table 10-15**, **EIA Chapter 10: Ornithology – Section 10.6.1**) and apportioned mortality compared to this figure to determine the proportional increase to SPA mortality rates presented by additional collision mortality associated with the CWP project.

Table 2-4: Increase to annual mortality rates resulting from collision mortalities apportioned to South Dublin Bay and River Tolka Estuary SPA in relation to SPA breeding population

Design Option	CRM Band Option	Annual impact to SPA	SPA population (breeding adults)	Adult annual mortality rate	Baseline estimated SPA annual mortality	Increase to SPA mortality rate
A	2	0.030	992	11.70%	116.064	0.026%
B	2	0.027				0.023%

Table 2-5: Increase to annual mortality rates resulting from collision mortalities apportioned to South Dublin Bay and River Tolka Estuary SPA in relation to SPA post-breeding aggregation population

Design Option	CRM Band Option	Annual impact to SPA	SPA population (post breeding aggregation)	Adult annual mortality rate	Baseline estimated SPA annual mortality	Increase to SPA mortality rate
A	2	0.531	17440	19.1%	3331.04	0.016%
B	2	0.475				0.014%

161. As additional mortality to the common tern SCI of South Dublin Bay and River Tolka Estuary SPA resulting from collision with operational WTGs is estimated to represent only a very small potential increase (much less than 0.1%) to SPA baseline mortality rates, this impact will not result in an AESI in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-5**. Specifically, this negligible increase to baseline mortality is considered not to represent a significant decline to the breeding population abundance or passage population size of this SCI. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

162. No specific mitigation is proposed, or required, in respect of collision during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

163. As per project only assessment, above.

Project-only effect on site integrity conclusion for impact

164. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**. With regards to collision impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance phase impact 5 – Presence of onshore buildings / infrastructure

Project-only assessment

165. Common tern is an SCI of South Dublin Bay and River Tolka Estuary SPA and has been assessed as being at risk from the presence of onshore infrastructure following operation and maintenance activities.

166. One breeding colony for this species was recorded near the onshore substation area during surveys, on the ESB Dolphin within the estuarine / Liffey study area (which forms part of the South Dublin Bay and River Tolka Estuary SPA), which is approximately 250 m from the north-eastern boundary of the onshore substation.

167. During the operation and maintenance of the onshore substation, the constructed infrastructure/buildings have the potential to provide perching points, which may be used by avian predator species. The close proximity to the known breeding sites for this SCI species, may lead to increased levels and threat of predation which may impact the long-term viability of the colony, due to reduced nesting and fledging rates and may cause the species to abandon the colony, which will cause adverse effects in relation to the Conservation Objectives, attributes and targets outlined in **Table 2-1**, specifically; breeding population abundance, productivity rate, distribution of breeding colonies and disturbance at the breeding site.

168. As such, the CWP Project would impede the overall objective of maintaining the favourable conservation condition of common tern in the SPA. Therefore, there is potential that the CWP Project will give rise to **an AESI on the South Dublin Bay and River Tolka Estuary SPA.**

169. The potential for the buildings and infrastructure to cast a shadow on the ESB dolphin is determined to be negligible due to the distance between the structure and the proposed development (approximately 250 m) and will not be assessed further.

Proposed mitigation

170. To reduce the actual or perceived, predator threat on the nesting colony, as a result of the provision of perching opportunities of avian predators such as peregrine falcon or hooded crow, the onshore substation has been designed to include a number of anti-perching devices, the details of which include the creation of steep angles at material junctions and the inclusion of a metal cladding raised above the parapet to obscure a hunting birds view, see **Plate 2-1**.

171. Once the construction of the onshore substation is complete, a survey will be conducted to identified areas which may still be used by avian predator species to perch and hunt from and corrective actions/implementation of additional anti-perching measures.

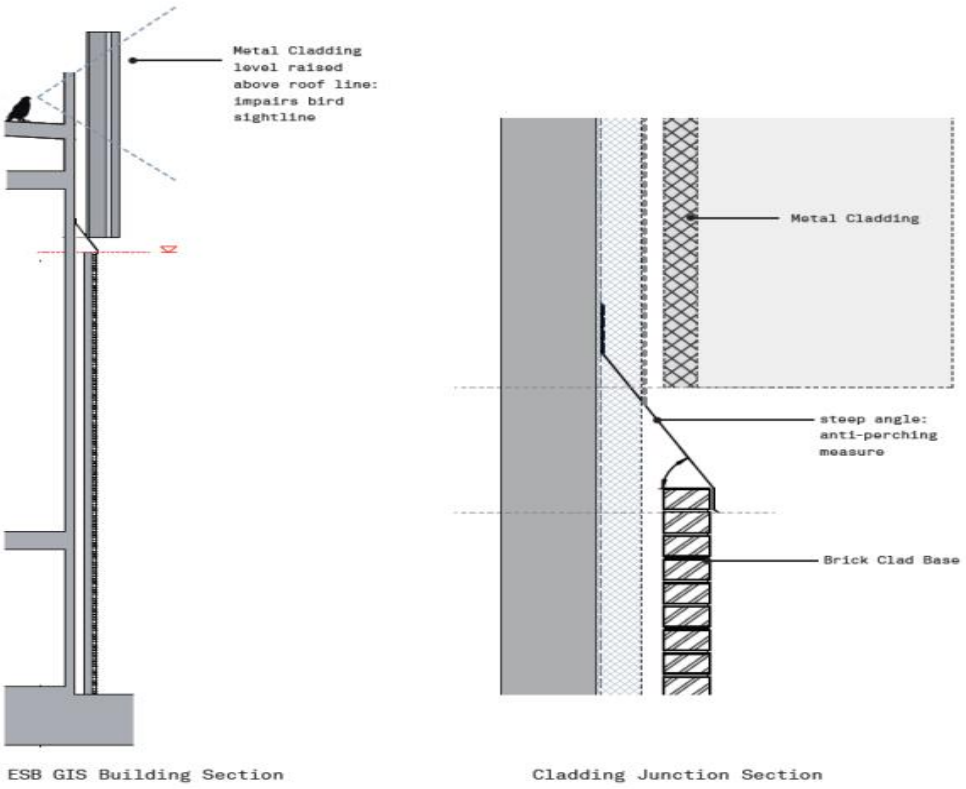


Plate 2-1: Example of anti-perching mitigation measures to be implemented

Residual impacts

172. With the implementation of mitigation as outlined above, there is no potential for AESI to result from the presence of onshore building/infrastructure to the common tern SCI of the South Dublin Bay and River Tolka Estuary SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-1**.

2.2.2 Receptor 2: Arctic tern

Construction Phase Impacts

Construction phase impact 1 – Direct effects on habitat

Array site

Project-only assessment

173. With regards to the array site, relevant construction phase direct effects on habitat relate to the alteration of sea surface areas as they become occupied by the footprint of installed infrastructure and, therefore, unavailable for use by seabird SCIs to undertake non-foraging behaviours.

174. As construction of the array site progresses through its planned duration of approximately 2.5 years, the above sea level spatial extent of infrastructure will increase to a maximum of less than 0.005 km^2 within the array site (i.e., combined sea level area of all WTGs and OSSs). This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Distribution: roosting areas (no significant decline); and
- Passage population (no significant decline).

175. In relation to these Conservation Objective attributes, the presence of built infrastructure following the removal of previously available habitat may reduce the marine areas in which individuals can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of construction phase activities within the array site may affect the energetic costs of non-foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

176. Despite the above potential pathways to impact, these direct effects on habitat do not affect any area of the SPA (and hence do not affect the distribution of foraging, roosting or breeding habitat of this SCI within the SPA). Further, the area of habitat loss represents a negligible proportion of sea area within the foraging range (mean-maximum + 1. S.D. = 40.5 km, Woodward et al., 2019) of Arctic tern breeding within South Dublin Bay and River Tolka Estuary SPA and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

177. In the context of the area of available habitat within foraging range of the SPA, and the negligible proportion that will be lost within the array site during construction, the scale of direct effects on habitat within the array site is considered to be negligible. In particular, the reduction in marine areas in which to undertake non-foraging behaviours, or requirement to use alternative areas for non-foraging behaviours, is not expected to give rise to energetic costs of non-foraging behaviours in such a way as to affect the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of resulting in a significant decline in the breeding population abundance or passage population of the Arctic tern SCI.

178. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of Arctic tern in the SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the South Dublin Bay and River Tolka Estuary SPA.

Proposed mitigation

179. No specific mitigation is proposed, or required, in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

180. As per project-only assessment, above.

OECC (Intertidal landfall)

Project only assessment

181. Impacts considered to be direct effects on habitat may arise as a consequence of activities which temporarily disturb areas of intertidal habitat which are utilised by ornithological SCIs. There is no direct loss or removal of intertidal habitat proposed by the CWP project. Direct effects on intertidal areas which may be utilised by birds for non-foraging behaviours (such as roosting, loafing and maintenance) are considered only to relate to the physical footprint of the proposed intertidal infrastructure and works (i.e., the intertidal cable route during construction and any infrastructure at the proposed landfall location).

182. The non-foraging capacity in which the Arctic tern SCI is considered primarily to use the intertidal habitat within South Dublin Bay is for roosting aggregations, especially during the post-breeding period (mid-July to early September).

183. Direct effects on intertidal habitat have the potential to impact on the following Conservation Objective attributes and targets for the Arctic tern SCI of South Dublin Bay and River Tolka Estuary SPA:

- Passage population (no significant decline); and
- Distribution: roosting areas (no significant decline).

184. In relation to these Conservation Objective attributes, construction of the CWP Project may temporarily reduce the areas in which individuals can undertake non-foraging behaviours (such as roosting) or require individuals to use alternative areas for these non-foraging behaviours. These impacts may affect energetic costs of non-foraging behaviours, which may in turn affect condition of individuals and survival rates.

185. The spatial extent of intertidal habitat within South Dublin Bay and River Tolka Estuary SPA is 21.94 km^2. Approximately 0.16 km^2 of intertidal habitat within South Dublin Bay is estimated to be subject to direct effects as a result of intertidal cable landfall activities (0.04 km^2 from open cut landfall cable duct installation, 0.006 km^2 from cofferdam installation, and 0.11 km^2 from cable laying activities in the transition zone). This equates to approximately 0.72% of the total intertidal habitat area within the SPA being subject to temporary direct effects on habitat during the construction phase of the proposed intertidal landfall works.

186. Following the backfilling of any excavated sections of trenching and removal of any supporting vehicles and / or infrastructure, it is considered that the re-establishment of intertidal habitat available to birds for non-foraging activities would occur rapidly due to the dynamic nature of intertidal habitats within South Dublin Bay. Any effects on the physical habitat around active intertidal construction loci would be brief, lasting less than several tidal cycles. Intertidal mudflats are considered resilient to isolated physical disturbances and can recover well (OSPAR, 2023).

187. Despite the above potential pathways to impact, in the context of the negligible proportion of intertidal habitat within the SPA which will be affected during construction and the short-term temporary nature of the effects to those habitats, the scale of direct effects on habitat within the OECC intertidal landfall area is considered to be negligible. In particular, the reduction in intertidal areas in which non-foraging behaviours are undertaken (including potential roosting areas used by Arctic tern during the post-breeding period), or requirement to use alternative areas for non-foraging behaviours, is not expected to give rise to energetic costs of non-foraging behaviours in such a way as to affect the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of resulting in a significant decline in the breeding population abundance or passage population of the Arctic tern SCI.

188. Similarly, temporary negligible short-term effects on the distribution of Arctic tern roosting areas within the SPA will not constitute any significant decline in relation to this Conservation Objective attribute.

189. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of Arctic tern in the SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the South Dublin Bay and River Tolka Estuary SPA.

Proposed mitigation

190. No specific mitigation is proposed, or required, in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

191. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

192. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**. With regards to direct effects on habitat impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Construction phase impact 2 – Disturbance and displacement

OECC (Intertidal landfall)

193. Common tern, Arctic tern and roseate tern are three closely related and morphologically similar species. During the post-breeding period and given the low-light conditions in which these species primarily utilise the intertidal habitats of South Dublin Bay and River Tolka Estuary SPA to form nocturnal roosting aggregations, it was generally not possible to differentiate these species during baseline surveys which were used to determine the number of individuals of these SCIs which may experience disturbance and displacement during crepuscular or nocturnal construction phase activities within the intertidal part of the OECC. Consequently, these species are considered collectively in relation to construction phase disturbance and displacement at the OECC intertidal landfall location. This means that when the impact values for *Sterna* terns are related to the population size of a particular species, the estimates of the proportions impacted are very precautionary.

Project-only assessment

194. Disturbance and displacement have the potential to impact on the following Conservation Objective attributes and targets for the Arctic tern SCI of South Dublin Bay and River Tolka Estuary SPA:

- Passage population (no significant decline);
- Distribution: roosting areas (no significant decline);
- Barriers to connectivity (no significant decline) and;
- Disturbance at the roosting site (human activities should occur at levels that do not adversely affect the numbers of Arctic tern among the post-breeding aggregation of terns).

195. In relation to these Conservation Objective attributes, construction within the OECC intertidal landfall area may temporarily reduce the areas in which individuals can undertake non-foraging behaviours (such as roosting) or require individuals to use alternative areas for these non-foraging behaviours. These impacts may affect energetic costs of such non-foraging behaviours, which may in turn affect condition of individuals and survival rates.

196. Acoustic stimuli associated with any given piling event during daylight hours, when terns are not forming nocturnal roosting aggregations within South Dublin Bay (from sunrise until approximately two hours before sunset (Tierney et al., 2016)), will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within the South Dublin Bay and River Tolka Estuary SPA (up to 0.3 individuals where the greatest extent of mobile construction activities (i.e. Alternative Alignment for the purposes of Modelling (AAM) scenario) are implemented). This represents a up to 1.07% of the average number of *Sterna* terns present within the South Dublin Bay section of the South Dublin Bay and River Tolka Estuary SPA during diurnal baseline surveys (28.02 individuals), up to 0.03% of the SPA Arctic tern breeding population (988 individuals – 2016 count, SMP 2023) and <0.01% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013 – 2018 (7,364 individuals - see Table 3.4 in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

197. Visual stimuli associated with intertidal cable route installation activities between sunrise and approximately two hours before sunset, will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within the South Dublin Bay and River Tolka Estuary SPA (up to 2.88 individuals for the most impactful cable laying route selection). This represents a up to 10.26% of the average number of *Sterna* terns present within the South Dublin Bay section of the South Dublin Bay and River Tolka Estuary SPA during diurnal baseline surveys (28.02 individuals), up to 0.29% of the SPA Arctic tern breeding population (988 individuals – 2016 count, SMP 2023) and 0.04% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013–2018 (7,364 individuals - see Table 3.4 in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

198. As such, given the very limited number of individuals potentially experiencing disturbance in relation to diurnal construction phase activities within intertidal areas of South Dublin and River Tolka Estuary SPA, there is no potential for AESI to result from such activities to the Arctic tern SCI of the SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-1**.

199. Should, however, construction activities be undertaken during periods in which *Sterna* terns form post breeding roosting aggregations within South Dublin Bay (specifically between one hour before sunset through to sunrise, from mid-July to September, inclusive), acoustic and visual stimuli from such activities may result in potential disturbance impacts to larger numbers of *Sterna* terns within the South Dublin Bay and River Tolka Estuary SPA, than if activities were conducted outside of these periods.

200. Unlike during diurnal periods, for which information relating to the ecological sensitivity of *Sterna* terns to visual and acoustic stimuli is available, disturbance responses of nocturnal roosting terns to such stimuli are unknown. As such, in the absence of being able to overlap disturbance effect ranges with

receptor distributions, to inform the assessment of potential disturbance and displacement impact magnitudes to roosting tern receptors for intertidal cable installation scenarios, the distribution of potential acoustic (piling) and visual (cable route laying) nocturnal disturbance sources are compared to roosting tern aggregation locations noted during baseline post-breeding tern aggregation surveys (

201.) and roosting tern aggregation locations which have been noted during other surveys of South Dublin Bay (**Figure 2-3** to **Figure 2-5**).

202. This comparison of tern roosting locations and cable route infrastructure indicates that, should cable route installation activities be undertaken during periods where roosting terns occupy roost sites, whilst there is uncertainty on the magnitude of the impact, there is the potential for disturbance impacts to large or very large proportions of large or very large numbers of roosting individuals within South Dublin Bay and River Tolka Estuary SPA.

203. As such, despite the limited duration of potential acoustic and visual disturbance impacts, there is assessed to be the potential for AESI to result from such activities to the Arctic tern SCI of the SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-1**.

Proposed mitigation

204. As intertidal habitats within South Dublin Bay are primarily used by *Sterna* tern species during their post-breeding migration periods (mid-July to late September) as nocturnal roosting areas, additional mitigation in the form of daily temporal restrictions (during the mid-July to late August period) is considered to be effective to ensure no AESI to the Arctic tern SCI of the SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-1**.

205. Full details of this daily temporal restriction additional mitigation are as follows:

- No construction phase cable route installation or associated activities, including preparatory works, will be undertaken between one hour prior to sunset and the following sunrise within the South Dublin Bay area during the period of mid-July to August, inclusive; and
- This area corresponds with the extent of intertidal habitat (areas between Mean Low Water Springs (MLWS) and MHWS) within the South Dublin Bay part of the South Dublin Bay and River Tolka Estuary SPA, and also includes a small area of terrestrial habitat covering the Goose Green area at Poolbeg.

206. With the daily temporary restrictions applied during the post-breeding period between mid-July to August, inclusive, potential project-only disturbance and displacement impacts are assessed as follows:

207. Acoustic stimuli associated with any given piling event within the period of April to August, inclusive, and during daylight hours (from sunrise until approximately one hour before sunset (Tierney et al., 2016), between mid-July and August, inclusive), will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within the South Dublin Bay and River Tolka Estuary SPA (up to 0.79 individuals where the greatest extent of mobile construction activities (i.e. Alternative Alignment for the purposes of Modelling (AAM) scenario) are implemented). This represents up to 1.00% of the average number of *Sterna* terns present within the South Dublin Bay section of the South Dublin Bay and River Tolka Estuary SPA during diurnal baseline surveys between April and August, inclusive (79.27 individuals), up to 0.08% of the SPA Arctic tern breeding population (988 individuals – 2016 count, SMP 2023) and 0.01% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013 – 2018 (7,364 individuals - see Table 3.4 in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

208. Visual stimuli associated with intertidal cable route installation activities within this period, will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within the South Dublin Bay and River Tolka Estuary SPA (up to 7.47 individuals for the most impactful cable

laying route selection). This represents a up to 9.42% of the average number of *Sterna* terns present within the South Dublin Bay section of the South Dublin Bay and River Tolka Estuary SPA during diurnal baseline surveys between April and August, inclusive (79.27 individuals), up to 0.76% of the SPA Arctic tern breeding population (988 individuals – 2016 count, SMP 2023) and 0.10% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013 – 2018 (7,364 individuals - see Table 3.4 in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

Residual impacts

209. With the implementation of mitigation as outlined above, given the very limited number of individuals potentially experiencing disturbance in relation to construction phase activities within intertidal areas of South Dublin and River Tolka Estuary SPA, there is no potential for AESI to result from such activities to the Arctic tern SCI of the SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-1**.

Project-only effect on site integrity conclusion for impact

210. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**. With regards to direct effects on disturbance and displacement impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Construction phase impact 3 – Changes in prey availability

Array site

Project only assessment

211. As the array site does not overlap this SPA and the SPA is beyond the range in which prey species may experience potential impacts from construction phase works, potential changes in prey availability impacts will occur entirely outside of the SPA, i.e., all impacts assessed here relate to prey species within ex situ habitats which may support this SPA SCI.

212. Arctic tern depredates a range of fish species, including sandeels and clupeids. Of its key prey species groups, clupeids are anticipated to be most impacted by underwater noise during the construction phase. Construction phase activities within the array site which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Passage population (no significant decline); and
- Prey biomass available (so significant decline).

213. These Conservation Objective attributes have the potential to be impacted through injury, mortality or TTS impacts on prey species, primarily during piling operations, they may also be impacted by Increased suspended sediment impacts to seabird prey species, primarily from dredging and trenching.

214. Injury or mortality for prey species may occur for individuals occurring very close to high noise level construction activities (primarily piling operations), however such effects will be localised and will be

minimised by 'soft start' procedures allowing mobile prey individuals to vacate very high noise level areas, prior to noise levels resulting in injury or mortality being reached. TTS impacts may result from exposure of prey species to lower underwater noise levels and consequently are experienced over a larger area than direct injury/mortality impacts.

215. Mortality or injury-inducing underwater noise impacts to these prey species groups (primarily in relation to pile driving for WTG and OSS foundation installation over up to 262.5 days, over a period of up to 3 years) are calculated to occur within only very low proportions of theoretical Arctic tern breeding season foraging areas around any given colony: less than 1.32% (mortality) and 3.65% (injury) of foraging areas estimated to be impacted for colonies within foraging range of the array site (mean-maximum + 1. S.D. = 40.5 km, Woodward et al., 2019).

216. TTS impacts to prey species are considered to be very temporary in nature, and as such will have very limited potential to result in population-level consequences to their seabird predators.

217. The spatial extent of temporarily disturbed areas of benthic habitat during construction phase activities are also assessed to be of negligible size in relation to seabird breeding and non-breeding season range extents. For example, the maximum potential extent of removed or altered benthic habitat within the array site is 6.30 km^2, which equates to 0.24% of foraging areas available to colonies within foraging range of the array site (mean-maximum + 1. S.D. = 40.5 km, Woodward et al., 2019).

218. It is expected that prey species likely to occur in the vicinity of construction activities within the array site will be largely unaffected by resultant low-level temporary increases in suspended sediment concentration, as the concentrations are likely to be within the range of natural variability tolerated by these species and will reduce to background concentrations within a very short period.

219. Consequently, there is assessed to be no potential for AESI to result from changes in prey availability during construction phase activities within the array site in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-1**.

Proposed mitigation

220. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

221. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

222. Arctic tern depredates a range of fish species, including sandeels and clupeids. Of its key prey species groups, clupeids are anticipated to be most impacted by underwater noise during the construction phase. Construction phase activities within the OECC intertidal landfall area which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Passage population (no significant decline); and
- Prey biomass available (so significant decline).

223. These Conservation Objective attributes have the potential to be impacted through a reduction in prey availability due to:

a. Increased suspended sediment levels may temporarily alter the distribution of fish and mobile invertebrate species should they respond to avoid areas of altered water column condition.

b. Alteration of habitats which support prey species may reduce the capacity of those habitats to hold or produce prey species, thereby reducing the abundance of prey available to foraging seabirds within and around impacted areas.

224. The extent of intertidal areas (between MLWS and MHWS) within South Dublin Bay is approximately 21.94 km^2, within which approximately 0.16 km^2 (0.72%) are predicted to be disturbed during landfall cable installation (see **Chapter 4: Project Description; Section 4.8**). As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during construction activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

225. It is therefore considered that there is no potential for AESI to result from changes in prey availability during construction phase activities within the OECC intertidal landfall area in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-1**.

Proposed mitigation

226. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

227. As per project only assessment, above.

Project-only effect on site integrity conclusion for impact

228. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**. With regards to changes in prey availability during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and Maintenance Phase Impacts

Operation and maintenance phase impact 1 – Direct effects on habitat

Array site

Project-only assessment

229. With regards to the array site, relevant operation and maintenance phase direct effects on habitat relate to the occupation of sea surface areas by the footprint of operational infrastructure and therefore become unavailable for use by seabird SCIs to undertake non-foraging behaviours. As the array site

does not overlap this SPA, all direct effects on habitat will occur entirely outside of the SPA, i.e., all direct effects assessed here relate to ex situ habitats which may support the Arctic tern SCI of South Dublin Bay and River Tolka Estuary SPA.

230. As the operation and maintenance phase progresses through its planned duration of 25 years, the above sea level spatial extent of infrastructure will at no point exceed 0.005 km^2 within the array site (i.e., combined sea level area of all WTGs and OSSs). This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for the Arctic tern SCI of South Dublin Bay and River Tolka Estuary SPA:

- Distribution: roosting areas (no significant decline); and
- Passage population (no significant decline).

231. In relation to these Conservation Objective attributes, operation and maintenance phase activities within the array site may reduce the marine areas in which individuals can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of the spatial footprint of operational infrastructure within the array site may affect the energetic costs of non-foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

232. Despite the above potential pathways to impact, these direct effects on habitat do not affect any area of the SPA (and hence do not affect the distribution of foraging, roosting or breeding habitat of this SCI within the SPA). Further, the area of habitat loss represents a negligible proportion of sea area within the foraging range (mean-maximum + 1. S.D. = 40.5 km, Woodward et al., 2019) of Arctic tern breeding within South Dublin Bay and River Tolka Estuary SPA and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

233. In the context of the extent of available habitat within foraging range of the SPA, and the negligible proportion that will be occupied by operational infrastructure, the scale of direct effects on habitat within the array site is considered to be negligible. In particular, the reduction in marine areas in which to undertake non-foraging behaviours, or requirement to use alternative areas for non-foraging behaviours, is not expected to give rise to energetic costs of non-foraging behaviours in such a way as to affect the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the breeding population abundance of this SPA SCI.

234. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of Arctic tern in the SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the South Dublin Bay and River Tolka Estuary SPA.

Proposed mitigation

235. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

236. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

237. Impacts considered to be direct effects on habitat may arise as a consequence of maintenance activities which temporarily remove or alter areas of intertidal habitat which are utilised by this SCI. Cable landfall duct maintenance activities and potential cable repair works during the operation and maintenance phase within South Dublin Bay have the potential to alter areas of intertidal habitat such that they become temporarily unavailable to Arctic tern connected with South Dublin Bay and River Tolka Estuary SPA, which may otherwise utilise those areas for non-foraging behaviours.

238. The non-foraging capacity in which the Arctic tern SCI is considered primarily to use the intertidal habitat within South Dublin Bay is for roosting aggregations, especially during the post-breeding period (mid-July to early September).

239. Direct effects on intertidal habitat have the potential to impact on the following Conservation Objective attributes and targets for the Arctic tern SCI of South Dublin Bay and River Tolka Estuary SPA:

- Passage population (no significant decline); and
- Distribution: roosting areas (no significant decline).

240. In relation to these Conservation Objective attributes, operation and maintenance of the CWP Project OECC intertidal landfall may result in temporary reductions in the spatial extent of the intertidal areas within South Dublin Bay in which individuals from South Dublin Bay and River Tolka Estuary SPA can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of operation and maintenance phase activities within the OECC intertidal landfall may directly affect demographic parameters (for example, use of alternative roosting areas may increase vulnerability to predation and reduce survival rates), or may affect the energetic costs of non-foraging behaviours through increased occupancy of sub-optimal area and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

241. Despite the above potential pathways to impact, as the spatial extent of any temporary direct effects on intertidal habitats from maintenance activities will be, at most extremely localised, should extraction and reinstatement of intertidal areas be required, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the passage population abundance of the Arctic tern SCI of South Dublin Bay and River Tolka Estuary SPA. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of the Arctic tern SCI of South Dublin Bay and River Tolka Estuary SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to South Dublin Bay and River Tolka Estuary SPA.

Proposed mitigation

242. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

243. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

244. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**. With regards to direct effects to habitat during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance phase impact 2 – Disturbance and displacement

OECC (Intertidal landfall)

Project only assessment

245. Disturbance and displacement have the potential to impact on the following Conservation Objective attributes and targets for the Arctic tern SCI of South Dublin Bay and River Tolka Estuary SPA:

- Passage population (no significant decline);
- Distribution: roosting areas (no significant decline);
- Barriers to connectivity (no significant decline); and
- Disturbance at the roosting site (human activities should occur at levels that do not adversely affect the numbers of Arctic tern among the post-breeding aggregation of terns).

246. Following installation of the OECC through the intertidal zone from the transition zone to the TJBs at the landfall location, the operational nature of any buried infrastructure within South Dublin Bay and River Tolka Estuary SPA is passive. Any routine visual inspection of the OECC does not extend to buried infrastructure within the SPA.

247. It is possible that unplanned maintenance may be required on buried infrastructure within the SPA during the operational phase of the project. In relation to these Conservation Objective attributes, any such unplanned maintenance activities have the potential to cause disturbance and displacement to Arctic tern within the vicinity of the impacted area. It is considered, however, that any unplanned maintenance activities on buried infrastructure within South Dublin Bay during the operational phase of the project would be restricted in terms of their frequency, temporal duration and spatial scale.

248. Given the extent of intertidal habitat available to the SCI, the short temporal duration of any unplanned maintenance activities and the passive nature of the operation of buried infrastructure within South Dublin Bay and River Tolka Estuary SPA, it is considered such that there is no potential for AESI to the SCI as a result of disturbance and displacement impacts during the operation and maintenance phase around the OECC intertidal landfall in relation to the Conservation Objectives, attributes and targets outlined in **Table 2-1**, above.

Proposed mitigation

249. No specific mitigation is proposed, or required, in respect of disturbance and displacement during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

250. As per project-only assessment, above.

Onshore infrastructure

Project-only assessment

251. Following installation of the substation and associated onshore landfall infrastructure, the operational nature of infrastructure in the vicinity of breeding Arctic tern colonies (including the ESB pontoon which forms part of the South Dublin Bay and River Tolka Estuary SPA) is passive.

252. It is possible that unplanned maintenance may be required on infrastructure during the operational phase of the project, and that such activities may occur within 200 m of breeding Arctic terns. It is considered, however, that routine activities during the operational phase of the project would be no greater in magnitude than existing anthropogenic activities to which breeding terns are already habituated.

253. Given short temporal duration of any unplanned maintenance activities and that routine operational activities are considered to be at levels to which breeding terns are already habituated, it is considered such that there is no potential for AESI to this SCI as a result of disturbance and displacement impacts during the operation and maintenance phase around the substation and associated onshore infrastructure, in relation to the Conservation Objectives, attributes and targets outlined in **Table 2-1**.

Proposed mitigation

254. No specific mitigation is proposed, or required, in respect of disturbance and displacement during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

255. **No project-only AESI for South Dublin Bay and Tolka Estuary SPA Arctic tern SCI via disturbance and displacement impacts from operation and maintenance phase activities within the onshore landfall area.**

Project-only effect on site integrity conclusion for impact

256. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**. With regards to disturbance and displacement during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance phase impact 3 – Changes in prey availability

Array site

Project-only assessment

257. As the array site does not overlap this SPA and the SPA is beyond the range in which prey species may experience potential impacts from operation and maintenance phase works, potential changes in prey availability impacts will occur entirely outside of the SPA, i.e., all impacts assessed here relate to prey species within ex situ habitats which may support this SPA SCI.

258. Arctic tern depredates a range of fish species, including sandeels and clupeids. Of its key prey species groups, clupeids are anticipated to be most impacted by underwater noise. Operation and maintenance phase activities within the array site which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Passage population (no significant decline); and
- Prey biomass available (so significant decline).

259. In relation to these Conservation Objective attributes, maintenance activities during the operational phase of the CWP Project array site may impact Arctic tern prey species through underwater noise effects, increases to suspended sediment concentrations, removal or alteration of important benthic habitats for those prey species, or electromagnetic field effects affecting prey species distributions around electrical infrastructure. Should these impacts to prey species reduce the availability of those prey species to foraging Arctic terns, this may result in effects to the demographic parameters, and resultant population dynamics, of this SCI through processes such as increased energetic consequences of foraging reducing individual condition and survival or productivity rates, or reduced provisioning rates to offspring reducing productivity rates. These potential consequences may compromise the ability of the SCI to maintain its population, with prey availability changes potentially resulting in there being insufficient habitat to support the SCI's population on a long-term basis.

260. As operational phase activities within the array site will not include piling works or any other very high energy underwater noise inducing activities, and operational noise impact magnitudes to all potential prey species are assessed to be very low, there is not considered to be a pathway for operation and maintenance phase underwater noise impacts to have the potential to cause perceptible changes to prey availability in such a way that could impact this SCI.

261. Similarly, as operational phase activities within the array site do not routinely require disturbance of the seabed (in the form of trenching or dredging activities) except within localised areas in which this is necessary to facilitate repairs, increased SSC levels, are considered to occur only potentially infrequently and locally during the operational phase and there is no perceptible pathway for this impact to have the potential to cause changes to prey availability during the operational phase in such a way that could impact this SCI.

262. Key fish species, upon which Arctic tern predate, may experience the loss of up to 0.49 km^2 of previously available benthic habitat within the array site as a result of occupancy of the seabed by infrastructure during the operation and maintenance phase of the CWP Project. The spatial extent of such prey species habitat loss is, however, considered to be of negligible size in relation to this SCI's breeding and non-breeding season range extents.

263. During the operation and maintenance phase, one additional potential impact to seabird receptor prey species which does not occur during the construction phase is considered, namely EMF effects, associated with electricity passing along infrastructure cables. Any effects on fish are anticipated to occur within the immediate vicinity of the cable and effect levels are likely to be low in relation to background levels associated with the Earth's magnetic field. The magnitude of such impacts to potentially sensitive fish species are assessed as being very low. Consequently, there is not considered to be a pathway for operation and maintenance phase EMF impacts to have the potential to cause impacts to prey availability in such a way that could impact this SCI.

264. Despite the above potential pathway to impact in the form of benthic habitat loss, the area in which impacts to prey species availability may occur represents a negligible proportion of sea area within the foraging range of Arctic tern breeding within South Dublin Bay and River Tolka Estuary (mean-maximum + 1. S.D. = 40.5 km, Woodward et al., 2019) and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

265. In the context of the extent of available habitat within foraging range of the SPA, the negligible proportion of that habitat in which potential impacts to prey species may occur, and that potential impacts to prey species may be of limited (if any) demographic consequence to their seabird predators, the scale of changes in prey availability impacts associated with operation and maintenance phase activities within the array site is considered to be negligible.

266. In particular, potential changes to prey availability resultant from operation and maintenance phase activities within the array site are not expected to perceptibly increase the energetic costs of foraging, or lead to reductions in offspring provisioning rates for the Arctic tern SCI of South Dublin Bay and River Tolka Estuary in such a way as to affect demographic parameters. Accordingly, the level of impact is not considered capable of altering the availability of prey species in such a way as to result in a significant decline in the breeding population abundance of this SPA SCI.

267. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of this SPA SCI. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA.

Proposed mitigation

268. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

269. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

270. Arctic tern depredates a range of fish species, including gadoids, sandeels and clupeids. Of its key prey species groups, gadoids and clupeids are anticipated to be most impacted by underwater noise during the operation and maintenance phase. Operation and maintenance phase activities within the OECC intertidal landfall area which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Passage population (no significant decline); and
- Prey biomass available (so significant decline).

271. Following installation of the OECC through the intertidal zone from the transition zone to the TJBs at the landfall location, the operational nature of any buried infrastructure within South Dublin Bay and River Tolka Estuary SPA is passive. Any routine visual inspection of the OECC does not extend to buried infrastructure within the SPA.

272. It is possible that unplanned maintenance may be required on buried infrastructure within the SPA during the operational phase of the project. In relation to these Conservation Objective attributes any such unplanned maintenance activities have the potential to cause disturbance and displacement to Arctic tern within the vicinity of the impacted area. It is considered, however, that any unplanned maintenance activities on buried infrastructure within South Dublin Bay during the operational phase of the project would be restricted in terms of their frequency, temporal duration and spatial scale.

273. The extent of intertidal areas (between MLWS and MHWS) within South Dublin Bay is approximately 21.94 km^2, within which approximately 0.16 km^2 (0.72%) are predicted to be disturbed during landfall cable installation (see **Chapter 4: Project Description; Section 4.8**). The scale of any maintenance to buried infrastructure carried out during the operation and maintenance phase will likely be considerably smaller than that during cable installation during the construction phase. As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during operation and maintenance activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

274. It is therefore considered that there is no potential for AESI to result from changes in prey availability during operation and maintenance phase activities within the OECC intertidal landfall area in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-1**.

Proposed mitigation

275. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

276. As per project only assessment, above.

Project-only effect on site integrity conclusion for impact

277. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**. With regards to changes in prey availability during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance impact 4 – Collision

Array site

Project-only assessment

278. During the operation and maintenance phase of the CWP Project the presence of operational WTGs within the array site may result in the mortality of this SPA SCI through the collision of individuals with turbine blades. Collision mortality has the potential to impact on the following Conservation Objective attribute and target for this SPA SCI:

- Passage population (no significant decline).

279. In relation to this Conservation Objective attribute, mortality resultant from collision with operational WTGs within the array site may directly affect the overall survival rate of this SPA SCI. Furthermore, collision mortality may also adversely affect the overall productivity rate of this SPA SCI through reductions to offspring provisioning rates and other parental care metrics. These potential consequences may compromise the ability of the SCI to maintain its population on a long-term basis.

280. Flight activity by this SCI recorded within the array site during baseline surveys was extremely low throughout the baseline survey period (see **Appendix 10.5: Baseline Characterisation Report** of the EIAR). Consequently, CRM has not been undertaken for this species on the basis that flight densities within the array site are extremely low and that resultant mortality rates to this SCI would be negligible.

281. As additional mortality to this SPA SCI resulting from collision with operational WTGs is estimated to represent only a negligible potential increase to SPA baseline mortality rates, this impact is considered not to impede the overall objective of maintaining / restoring the favourable conservation condition of the SPA SCI. Specifically, collision mortality will not affect the population dynamics of the SCI in such a way as to compromise its ability to maintain itself on a long-term basis as a viable component of its natural habitats. In light of these factors, it can be concluded beyond reasonable scientific doubt that **the CWP Project will not give rise to any AESI to this SPA SCI**.

Proposed mitigation

282. No specific mitigation is proposed, or required, in respect of collision during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

283. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

284. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**. With regards to collision impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

2.2.3 Receptor 3: Roseate tern

Construction Phase Impacts

Construction phase impact 1 – Direct effects on habitat

Array site

Project-only assessment

285. With regards to the array site, relevant construction phase direct effects on habitat relate to the alteration of sea surface areas as they become occupied by the footprint of installed infrastructure and, therefore, unavailable for use by seabird SCIs to undertake non-foraging behaviours.

286. As construction of the array site progresses through its planned duration of approximately 2.5 years, the above sea level spatial extent of infrastructure will increase to a maximum of less than 0.005 km^2 within the array site (i.e., combined sea level area of all WTGs and OSSs). This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Distribution: roosting areas (no significant decline); and
- Passage population (no significant decline).

287. In relation to these Conservation Objective attributes, the presence of built infrastructure following the removal of previously available habitat may reduce the marine areas in which individuals can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of construction phase activities within the array site may affect the energetic costs of non-foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

288. Despite the above potential pathways to impact, these direct effects on habitat do not affect any area of the SPA (and hence do not affect the distribution of foraging, roosting or breeding habitat of this SCI within the SPA). Further, the area of habitat loss represents a negligible proportion of sea area within the foraging range (mean-maximum + 1. S.D. = 23.2 km, Woodward et al., 2019) of roseate tern breeding within South Dublin Bay and River Tolka Estuary SPA and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

289. In the context of the area of available habitat within foraging range of the SPA, and the negligible proportion that will be lost within the array site during construction, the scale of direct effects on habitat within the array site is considered to be negligible. In particular, the reduction in marine areas in which to undertake non-foraging behaviours, or requirement to use alternative areas for non-foraging behaviours, is not expected to give rise to energetic costs of non-foraging behaviours in such a way as to affect the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of resulting in a significant decline in the breeding population abundance or passage population of the Roseate tern SCI.

290. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of roseate tern in the SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the South Dublin Bay and River Tolka Estuary SPA.

Proposed mitigation

291. No specific mitigation is proposed or required in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

292. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

293. Impacts considered to be direct effects on habitat may arise as a consequence of activities which temporarily disturb areas of intertidal habitat which are utilised by ornithological SCIs. There is no direct loss or removal of intertidal habitat proposed by the CWP project. Direct effects to intertidal areas which may be utilised by birds for non-foraging behaviours (such as roosting, loafing and maintenance) are considered only to relate to the physical footprint of the proposed intertidal

infrastructure and works (i.e. the intertidal cable route during construction and any infrastructure at the proposed landfall location).

294. The non-foraging capacity in which the Roseate tern SCI is considered primarily to use the intertidal habitat within South Dublin Bay is for roosting aggregations, especially during the post-breeding period (mid-July to early September).

295. Direct effects on intertidal habitat have the potential to impact on the following Conservation Objective attributes and targets for the Roseate tern SCI of South Dublin Bay and River Tolka Estuary SPA:

- Passage population (no significant decline); and
- Distribution: roosting areas (no significant decline).

296. In relation to these Conservation Objective attributes, construction in the OECC landfall area may temporarily reduce the areas in which individuals can undertake non-foraging behaviours (such as roosting) or require individuals to use alternative areas for these non-foraging behaviours. These impacts may affect energetic costs of non-foraging behaviours, which may in turn affect condition of individuals and survival rates.

297. The spatial extent of intertidal habitat within South Dublin Bay and River Tolka Estuary SPA is 21.94 km^2. Approximately 0.16 km^2 of intertidal habitat within South Dublin Bay is estimated to be subject to direct effects as a result of intertidal cable landfall activities (0.04 km^2 from open cut landfall cable duct installation, 0.006 km^2 from cofferdam installation, and 0.11 km^2 from cable laying activities in the transition zone). This equates to approximately 0.72% of the total intertidal habitat area within the SPA being subject to temporary direct effects on habitat during the construction phase of the proposed intertidal landfall works.

298. Following the backfilling of any excavated sections of trenching and removal of any supporting vehicles and / or infrastructure, it is considered that the re-establishment of intertidal habitat available to birds for non-foraging activities would occur rapidly due to the dynamic nature of intertidal habitats within South Dublin Bay. Any effects on the physical habitat around active intertidal construction loci would be brief, lasting less than several tidal cycles. Intertidal mudflats are considered resilient to isolated physical disturbances and can recover well (OSPAR, 2023).

299. Despite the above potential pathways to impact, in the context of the negligible proportion of intertidal habitat within the SPA which will be affected during construction and the short-term temporary nature of the effects to those habitats, the scale of direct effects on habitat within the OECC intertidal landfall area is considered to be negligible. In particular, the reduction in intertidal areas in which non-foraging behaviours are undertaken (including potential roosting areas used by Roseate tern during the post-breeding period), or requirement to use alternative areas for non-foraging behaviours, is not expected to give rise to energetic costs of non-foraging behaviours in such a way as to affect the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of resulting in a significant decline in the breeding population abundance or passage population of the Roseate tern SCI.

300. Similarly, temporary negligible short-term effects on the distribution of Roseate tern roosting areas within the SPA will not constitute any significant decline in relation to this Conservation Objective attribute.

301. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of Roseate tern in the SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the South Dublin Bay and River Tolka Estuary SPA.

Proposed mitigation

302. No specific mitigation is proposed, or required, in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

303. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

304. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**. With regards to direct effects on habitat impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Construction phase impact 2 – Disturbance and displacement

OECC (Intertidal landfall)

305. Comon tern, Arctic tern and roseate tern are three closely related and morphologically similar species. During the post-breeding period and given the low-light conditions in which these species primarily utilise the intertidal habitats of South Dublin Bay and River Tolka Estuary SPA to form nocturnal roosting aggregations, it was generally not possible to differentiate these species during baseline surveys which were used to determine the number of individuals of these SCIs which may experience disturbance and displacement during crepuscular or nocturnal construction phase activities within the intertidal part of the OECC. Consequently, these species are considered collectively in relation to construction phase disturbance and displacement at the OECC intertidal landfall location. This means that when the impact values for *Sterna* terns are related to the population size of a particular species, the estimates of the proportions impacted are very precautionary.

Project-only assessment

306. Disturbance and displacement have the potential to impact on the following Conservation Objective attributes and targets for the Roseate tern SCI of South Dublin Bay and River Tolka Estuary SPA:

- Passage population (no significant decline);
- Distribution: roosting areas (no significant decline);
- Barriers to connectivity (no significant decline); and
- Disturbance at the roosting site (human activities should occur at levels that do not adversely affect the numbers of Roseate tern among the post-breeding aggregation of terns).

307. In relation to these Conservation Objective attributes, construction within the OECC intertidal landfall area may temporarily reduce the areas in which individuals can undertake non-foraging behaviours (such as roosting) or require individuals to use alternative areas for these non-foraging behaviours. These impacts may affect energetic costs of such non-foraging behaviours, which may in turn affect condition of individuals and survival rates.

308. Acoustic stimuli associated with any given piling event during daylight hours, when terns are not forming nocturnal roosting aggregations within South Dublin Bay (from sunrise until approximately two hours before sunset (Tierney et al., 2016)), will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within the South Dublin Bay and River Tolka Estuary SPA (up to 0.3 individuals where the greatest extent of mobile construction activities (i.e. Alternative Alignment for the purposes of Modelling (AAM) scenario) are implemented). This represents a up to 1.07% of the average number of *Sterna* terns present within the South Dublin Bay Section of the South Dublin Bay and River Tolka Estuary SPA during diurnal baseline surveys (28.02 individuals), up to 0.03% of the SPA Roseate tern breeding population (988 individuals – 2016 count, SMP 2023) and <0.01% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013–2018 (7,364 individuals - see Table 3.4 of **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

309. Visual stimuli associated with intertidal cable route installation activities between sunrise and approximately two hours before sunset, will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within the South Dublin Bay and River Tolka Estuary SPA (up to 2.88 individuals for the most impactful cable laying route selection). This represents a up to 10.26% of the average number of *Sterna* terns present within the South Dublin Bay Section of the South Dublin Bay and River Tolka Estuary SPA during diurnal baseline surveys (28.02 individuals), up to 0.29% of the SPA Roseate tern breeding population (988 individuals – 2016 count, SMP 2023) and 0.04% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013–2018 (7,364 individuals - see **Table 3.4** in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

310. As such, given the very limited number of individuals potentially experiencing disturbance in relation to diurnal construction phase activities within intertidal areas of South Dublin and River Tolka Estuary SPA, there is no potential for AESI to result from such activities to the Roseate tern SCI of the SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-1**.

311. Should, however, construction activities be undertaken during periods in which *Sterna* terns form post breeding roosting aggregations within South Dublin Bay (specifically between one hour before sunset through to sunrise, from mid-July to September, inclusive), acoustic and visual stimuli from such activities may result in potential disturbance impacts to larger numbers of *Sterna* terns within the South Dublin Bay and River Tolka Estuary SPA, than if activities were conducted outside of these periods.

312. Unlike during diurnal periods, for which information relating to the ecological sensitivity of Sterna terns to visual and acoustic stimuli is available, disturbance responses of nocturnal roosting terns to such stimuli are unknown. As such, in the absence of being able to overlap disturbance effect ranges with receptor distributions, to inform the assessment of potential disturbance and displacement impact magnitudes to roosting tern receptors for intertidal cable installation scenarios, the distribution of potential acoustic (piling) and visual (cable route laying) nocturnal disturbance sources are compared to roosting tern aggregation locations noted during baseline post-breeding tern aggregation surveys (

313. ; and **Appendix 10.5: Baseline Characterisation Report** of the EIAR) and roosting tern aggregation locations which have been noted during other surveys of South Dublin Bay **Figure 2-3** to **Figure 2-5**).

314. This comparison of tern roosting locations and cable route infrastructure indicates that, should cable route installation activities be undertaken during periods where roosting terns occupy roost sites, whilst there is uncertainty on the magnitude of the impact, there is the potential for disturbance impacts to large or very large proportions of large or very large numbers of roosting individuals within South Dublin Bay and River Tolka Estuary SPA.

315. As such, despite the limited duration of potential acoustic and visual disturbance impacts, there is assessed to be the potential for AESI to result from such activities to the roseate tern SCI of the SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-1**.

Proposed mitigation

316. As intertidal habitats within South Dublin Bay are primarily used by *Sterna* tern species during their post-breeding migration periods (mid-July to late September) as nocturnal roosting areas, additional mitigation in the form of daily temporal restrictions (during the mid-July to late August period) is considered to be effective to ensure no AESI to the Roseate tern SCI of the SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-1**, above.

317. Full details of this daily temporal restriction additional mitigation are as follows:

- No construction phase cable route installation or associated activities, including preparatory works, will be undertaken between one hour prior to sunset and the following sunrise within the South Dublin Bay area during the period of mid-July to August, inclusive; and
- This area corresponds with the extent of intertidal habitat (areas between Mean Low Water Springs (MLWS) and MHWS) within the South Dublin Bay part of the South Dublin Bay and River Tolka Estuary SPA, and also includes a small area of terrestrial habitat covering the Goose Green area at Poolbeg.

Residual impacts

318. With the daily temporary restrictions applied during the post-breeding period between mid-July to August, inclusive, potential project-only disturbance and displacement impacts are assessed as follows:

319. Acoustic stimuli associated with any given piling event within the period of April to August, inclusive, and during daylight hours (from sunrise until approximately one hour before sunset, between mid-July and August, inclusive), will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within the South Dublin Bay and River Tolka Estuary SPA (up to 0.79 individuals where the greatest extent of mobile construction activities are implemented). This represents up to 1.00% of the average number of *Sterna* terns present within the South Dublin Bay section of the South Dublin Bay and River Tolka Estuary SPA during diurnal baseline surveys between April and August, inclusive (79.27 individuals), up to 0.08% of the SPA Roseate tern breeding population (988 individuals – 2016 count, SMP 2023) and 0.01% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013–2018 (7,364 individuals - see Table 3.4 in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

320. Visual stimuli associated with intertidal cable route installation activities within this period, will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within the South Dublin Bay and River Tolka Estuary SPA (up to 7.47 individuals for the most impactful cable laying route selection). This represents a up to 9.42% of the average number of *Sterna* terns present within the South Dublin Bay section of the South Dublin Bay and River Tolka Estuary SPA during diurnal baseline surveys between April and August, inclusive (79.27 individuals), up to 0.76% of the SPA Roseate tern breeding population (988 individuals – 2016 count, SMP 2023) and 0.10% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013–2018 (7,364 individuals - see Table 3.4 in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

321. With the implementation of mitigation as outlined above, given the very limited number of individuals potentially experiencing disturbance in relation to construction phase activities within intertidal areas of South Dublin and River Tolka Estuary SPA, there is no potential for AESI to result from such activities to the Roseate tern SCI of the SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-1**.

Onshore infrastructure

Project-only assessment

322. This species has been assessed as being at risk from disturbance and displacement during construction within the onshore development area. One Roseate tern breeding colony was recorded during onshore surveys near to the onshore substation area on a mooring dolphin owned by the Electricity Supply Board (ESB), which is associated with the South Dublin Bay and River Tolka Estuary SPA. The established Roseate tern colony occurs approximately 250 m to the northeast of the onshore substation area during the breeding season. According to Goodship and Furness (2022), this species is assessed as having medium sensitivity to human disturbance at breeding colonies and suggest a 200 m buffer zone around colonies to protect the species from pedestrian disturbance, but that a larger buffer may be required if terns are not habituated to disturbance or if there is likely to be aerial disturbance.

323. It is important to note that this colony, near the onshore substation area, is located within Dublin Port, which is a busy shipping and industrial area. A report prepared by ALCnature on behalf of CWP Project (see **Appendix 10.9** of the EIAR), was commissioned to determine the current disturbance tolerance of the breeding terns near to the proposed onshore substation. The study recreated potential construction disturbance / displacement included experimental disturbances in the form of the movement of personnel and machinery, creating light and moderate noise, within the onshore substation site. The results concluded that the terns within this study area have habituated to high levels of background disturbance and show low levels of disturbance to several current forms of more severe sporadic disturbance events, such as boats, traffic, predators, humans and aircraft.

324. In this context based on the distance of the onshore substation construction works to the breeding Roseate tern colony and the habituation of the species to activities within Dublin Bay, the scale of disturbance and displacement effects on Roseate tern within the breeding colony is considered to be negligible. The level of impact is not considered capable of resulting in a significant decline in breeding population abundance, productivity rate, passage population, and/or distribution of breeding colonies and roosting areas. Accordingly, the CWP Project will not impede the overall objective of maintaining the favourable conservation condition of Roseate tern in the SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the South Dublin Bay and River Tolka Estuary SPA.

325. Despite this and the roseate tern's tolerance to some levels of disturbance, the CWP project proposes mitigation on a precautionary basis to manage the potential disturbance and displacement impacts to the breeding Roseate tern SCI during the construction phase associated with the onshore substation development.

Proposed mitigation

326. Mitigation measures applicable to terns have been detailed in a tern disturbance report prepared by ALCnature (**Appendix 10.9** of the EIAR), a summary of these mitigation measures include the following:

<u>Restriction period</u>

327. The period from 1 May to 15 August shall be defined as the tern breeding season and restrictions will apply as detailed below. The latter date may require amendment subject to progress of the breeding season and this should be monitored as the season progresses.

Visual screening

328. A solid screen (hoarding) around the periphery of the construction works, will be erected and maintained to a height of 2.5 m. Screening will be in place during the period of 1 May to 15 August. Work above hoarding height (including movement and noise of machinery or personnel) and within 40 m, will be limited to periods of <5 minutes per hour.

Noise & lighting limits

329. High noise and vibration activities (e.g., piling) will be restricted to outside a 75 m buffer zone of the tern colony between 1 May and 15 August.

330. There will be no lighting to the exterior of hoarding in line of sight of the tern colony between 1 May and 15 August, and no works will occur in hours of darkness between 1 May and 15 August.

Monitoring and response

331. Monitoring of responses exhibited by the tern colony shall be carried out in accordance with a structured plan throughout the breeding season, in order to enable appropriate responses to disturbance events (i.e., enabling or restricting works subject to response observed).

Special measures during fledging period

332. During the period when chicks are fledging and may leave the colony platform (typically July to mid-August), birds may move to shoreline areas to seek dry perches. During this time, there is a risk of tern chicks entering the onshore development area and adults defending chicks by attacking personnel. The potential loss of chicks through exclusion of adults or through injury is apparent and during this period a trained ecologist will be on hand to locate and capture chicks in close proximity to the work areas and relocate them to suitable safe areas to avoid these issues.

Residual impacts

333. The CWP Project will not impede the overall objective of maintaining the favourable conservation condition of Roseate tern in the SPA. In light of these factors, an in the absence of mitigation measure, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the South Dublin Bay and River Tolka Estuary SPA.

334. However, the addition of additional mitigation measures will further reduce the impact of the CWP Project as a result from disturbance and displacement during the construction phase at the onshore area in relation to the Conservation Objectives and attributes and targets for this SCI within the South Dublin Bay and River Tolka Estuary SPA.

Project-only effect on site integrity conclusion for impact

335. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**, above. With regards to direct effects on disturbance and displacement impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the

Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Construction phase impact 3 – Changes in prey availability

Array site

Project-only assessment

336. As the array site does not overlap this SPA and the SPA is beyond the range in which prey species may experience potential impacts from construction phase works, potential changes in prey availability impacts will occur entirely outside of the SPA, i.e., all impacts assessed here relate to prey species within ex situ habitats which may support this SPA SCI.

337. Roseate tern depredates a range of fish species, including sandeels, sprat and herring. Of its key prey species groups, sprat and herring are anticipated to be most impacted by underwater noise during the construction phase. Construction phase activities within the array site which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Passage population (no significant decline); and
- Prey biomass available (so significant decline).

338. These Conservation Objective attributes have the potential to be impacted through injury, mortality or TTS impacts on prey species, primarily during piling operations, they may also be impacted by Increased suspended sediment impacts to seabird prey species, primarily from dredging and trenching.

339. Injury or mortality for prey species may occur for individuals occurring very close to high noise level construction activities (primarily piling operations), however such effects will be localised and will be minimised by 'soft start' procedures allowing mobile prey individuals to vacate very high noise level areas, prior to noise levels resulting in injury or mortality being reached. TTS impacts may result from exposure of prey species to lower underwater noise levels and consequently are experienced over a larger area than direct injury/mortality impacts.

340. Mortality or injury-inducing underwater noise impacts to these prey species groups (primarily in relation to pile driving for WTG and OSS foundation installation over up to 262.5 days, over a period of up to 3 years) are calculated to occur within only very low proportions of theoretical roseate tern breeding season foraging areas around any given colony: less than 4.02% (mortality) and 11.12% (injury) of foraging areas estimated to be impacted for colonies within foraging range of the array site (mean-maximum + 1. S.D. = 23.2 km, Woodward et al., 2019).

341. TTS impacts to prey species are considered to be very temporary in nature, and as such will have very limited potential to result in population-level consequences to their seabird predators.

342. The spatial extent of temporarily disturbed areas of benthic habitat during construction phase activities are also assessed to be of negligible size in relation to seabird breeding and non-breeding season range extents. For example, the maximum potential extent of removed or altered benthic habitat within the array site is 6.30 km^2, which equates to 0.75% of foraging areas available to colonies within foraging range of the array site (mean-maximum + 1. S.D. = 23.2 km, Woodward et al., 2019).

343. It is expected that prey species likely to occur in the vicinity of construction activities within the array site will be largely unaffected by resultant low-level temporary increases in suspended sediment

concentration, as the concentrations are likely to be within the range of natural variability tolerated by these species and will reduce to background concentrations within a very short period.

344. Consequently, there is assessed to be no potential for AESI to result from changes in prey availability during construction phase activities within the array site in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-1**, above.

Proposed mitigation

345. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

346. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

347. Roseate tern depredates a range of fish species, including gadoids, sandeels and clupeids. Of its key prey species groups, gadoids and clupeids are anticipated to be most impacted by underwater noise during the construction phase. Construction phase activities within the OECC intertidal landfall area which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Passage population (no significant decline); and
- Prey biomass available (so significant decline).

348. These Conservation Objective attributes have the potential to be impacted through a reduction in prey availability due to:

a. Increased suspended sediment levels may temporarily alter the distribution of fish and mobile invertebrate species should they respond to avoid areas of altered water column condition.

b. Alteration of habitats which support prey species may reduce the capacity of those habitats to hold or produce prey species, thereby reducing the abundance of prey available to foraging seabirds within and around impacted areas.

349. The extent of intertidal areas (between MLWS and MHWS) within South Dublin Bay is approximately 21.94 km^2, within which approximately 0.16 km^2 (0.72%) are predicted to be disturbed during landfall cable installation (see **Chapter 4: Project Description; Section 4.8**). As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during construction activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

350. It is therefore considered that there is no potential for AESI to result from changes in prey availability during construction phase activities within the OECC intertidal landfall area in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-1**, above.

Proposed mitigation

351. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

352. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

353. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**. With regards to changes in prey availability during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and Maintenance Phase Impacts

Operation and maintenance phase impact 1 – Direct effects on habitat

Array site

Project-only assessment

354. With regards to the array site, relevant operation and maintenance phase direct effects on habitat relate to the occupation of sea surface areas by the footprint of operational infrastructure and therefore become unavailable for use by seabird SCIs to undertake non-foraging behaviours. As the array site does not overlap this SPA, all direct effects on habitat will occur entirely outside of the SPA, i.e., all direct effects assessed here relate to ex situ habitats which may support the roseate tern SCI of South Dublin Bay and River Tolka Estuary SPA.

355. As the operation and maintenance phase progresses through its planned duration of 25 years, the above sea level spatial extent of infrastructure will at no point exceed 0.005 km^2 within the array site (i.e., combined sea level area of all WTGs and OSSs). This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for the roseate tern SCI of South Dublin Bay and River Tolka Estuary SPA:

- Distribution: roosting areas (no significant decline); and
- Passage population (no significant decline).

356. In relation to these Conservation Objective attributes, operation and maintenance phase activities within the array site may reduce the marine areas in which individuals can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of the spatial footprint of operational infrastructure within the array site may affect the energetic costs of non-foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

357. Despite the above potential pathways to impact, these direct effects on habitat do not affect any area of the SPA (and hence do not affect the distribution of foraging, roosting or breeding habitat of this SCI

within the SPA). Further, the area of habitat loss represents a negligible proportion of sea area within the foraging range (mean-maximum + 1. S.D. = 23.2 km, Woodward et al., 2019) of roseate tern breeding within South Dublin Bay and River Tolka Estuary SPA and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

358. In the context of the extent of available habitat within foraging range of the SPA, and the negligible proportion that will be occupied by operational infrastructure, the scale of direct effects on habitat within the array site is considered to be negligible. In particular, the reduction in marine areas in which to undertake non-foraging behaviours, or requirement to use alternative areas for non-foraging behaviours, is not expected to give rise to energetic costs of non-foraging behaviours in such a way as to affect the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the breeding population abundance of this SPA SCI.

359. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of roseate tern in the SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the South Dublin Bay and River Tolka Estuary SPA.

Proposed mitigation

360. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

361. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

362. Impacts considered to be direct effects on habitat may arise as a consequence of maintenance activities which temporarily remove or alter areas of intertidal habitat which are utilised by this SCI. Cable landfall duct maintenance activities and potential cable repair works during the operation and maintenance phase within South Dublin Bay have the potential to alter areas of intertidal habitat such that they become temporarily unavailable to roseate tern connected with South Dublin Bay and River Tolka Estuary SPA, which may otherwise utilise those areas for non-foraging behaviours.

363. The non-foraging capacity in which the roseate tern SCI is considered primarily to use the intertidal habitat within South Dublin Bay is for roosting aggregations, especially during the post-breeding period (mid-July to early September).

364. Direct effects on intertidal habitat have the potential to impact on the following Conservation Objective attributes and targets for the roseate tern SCI of South Dublin Bay and River Tolka Estuary SPA:

- Passage population (no significant decline); and
- Distribution: roosting areas (no significant decline).

365. In relation to these Conservation Objective attributes, operation and maintenance of the CWP Project OECC intertidal landfall may result in temporary reductions in the spatial extent of the intertidal areas

within South Dublin Bay in which individuals from South Dublin Bay and River Tolka Estuary SPA can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of operation and maintenance phase activities within the OECC intertidal landfall may directly affect demographic parameters (for example, use of alternative roosting areas may increase vulnerability to predation and reduce survival rates), or may affect the energetic costs of non-foraging behaviours through increased occupancy of sub-optimal area and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

366. Despite the above potential pathways to impact, as the spatial extent of any temporary direct effects on intertidal habitats from maintenance activities will be, at most extremely localised, should extraction and reinstatement of intertidal areas be required, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the passage population abundance of the roseate tern SCI of South Dublin Bay and River Tolka Estuary SPA. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of the roseate tern SCI of South Dublin Bay and River Tolka Estuary SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to South Dublin Bay and River Tolka Estuary SPA.

Proposed mitigation

367. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

368. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

369. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**. With regards to direct effects to habitat during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance phase impact 2 – Disturbance and displacement

OECC (Intertidal landfall)

Project-only assessment

370. Disturbance and displacement have the potential to impact on the following Conservation Objective attributes and targets for the roseate tern SCI of South Dublin Bay and River Tolka Estuary SPA:

- Passage population (no significant decline);
- Distribution: roosting areas (no significant decline);
- Barriers to connectivity (no significant decline); and
- Disturbance at the roosting site (human activities should occur at levels that do not adversely affect the numbers of roseate tern among the post-breeding aggregation of terns).

371. Following installation of the OECC through the intertidal zone from the transition zone to the TJBs at the landfall location, the operational nature of any buried infrastructure within South Dublin Bay and River Tolka Estuary SPA is passive. Any routine visual inspection of the OECC does not extend to buried infrastructure within the SPA.

372. It is possible that unplanned maintenance may be required on buried infrastructure within the SPA during the operational phase of the project. In relation to these Conservation Objective attributes, any such unplanned maintenance activities have the potential to cause disturbance and displacement to roseate tern within the vicinity of the impacted area. It is considered, however, that any unplanned maintenance activities on buried infrastructure within South Dublin Bay during the operational phase of the project would be restricted in terms of their frequency, temporal duration and spatial scale.

373. Given the extent of intertidal habitat available to the SCI, the short temporal duration of any unplanned maintenance activities and the passive nature of the operation of buried infrastructure within South Dublin Bay and River Tolka Estuary SPA, it is considered such that there is no potential for AESI to the SCI as a result of disturbance and displacement impacts during the operation and maintenance phase around the OECC intertidal landfall in relation to the Conservation Objectives, attributes and targets outlined in **Table 2-1**.

Proposed mitigation

374. No specific mitigation is proposed, or required, in respect of disturbance and displacement during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

375. As per project-only assessment, above.

Onshore infrastructure

Project-only assessment

376. Following installation of the substation and associated onshore landfall infrastructure, the operational nature of infrastructure in the vicinity of breeding roseate tern colonies (including the ESB pontoon which forms part of the South Dublin Bay and River Tolka Estuary SPA) is passive.

377. It is possible that unplanned maintenance may be required on infrastructure during the operational phase of the project, and that such activities may occur within 200 m of breeding roseate terns. It is considered, however, that routine activities during the operational phase of the project would be no greater in magnitude than existing anthropogenic activities to which breeding terns are already habituated.

378. Given short temporal duration of any unplanned maintenance activities and that routine operational activities are considered to be at levels to which breeding terns are already habituated, it is considered such that there is no potential for AESI to this SCI as a result of disturbance and displacement impacts during the operation and maintenance phase around the substation and associated onshore infrastructure, in relation to the Conservation Objectives, attributes and targets outlined in **Table 2-1**.

Proposed mitigation

379. No specific mitigation is proposed, or required, in respect of disturbance and displacement during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

380. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

381. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**. With regards to disturbance and displacement during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance phase impact 3 – Changes in prey availability

Array site

Project-only assessment

382. As the array site does not overlap this SPA and the SPA is beyond the range in which prey species may experience potential impacts from operation and maintenance phase works, potential changes in prey availability impacts will occur entirely outside of the SPA, i.e., all impacts assessed here relate to prey species within ex situ habitats which may support this SPA SCI.

383. Roseate tern depredates a range of fish species, including sandeels, sprat and herring. Of its key prey species groups, sprat and herring are anticipated to be most impacted by underwater noise. Operation and maintenance phase activities within the array site which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Passage population (no significant decline); and
- Prey biomass available (so significant decline).

384. In relation to these Conservation Objective attributes, maintenance activities during the operational phase of the CWP Project array site may impact roseate tern prey species through underwater noise effects, increases to suspended sediment concentrations, removal or alteration of important benthic habitats for those prey species, or electromagnetic field effects affecting prey species distributions around electrical infrastructure. Should these impacts to prey species reduce the availability of those prey species to foraging roseate terns, this may result in effects to the demographic parameters, and resultant population dynamics, of this SCI through processes such as increased energetic consequences of foraging reducing individual condition and survival or productivity rates, or reduced provisioning rates to offspring reducing productivity rates. These potential consequences may compromise the ability of the SCI to maintain its population, with prey availability changes potentially resulting in there being insufficient habitat to support the SCI's population on a long-term basis.

385. As operational phase activities within the array site will not include piling works or any other very high energy underwater noise inducing activities, and operational noise impact magnitudes to all potential prey species are assessed to be very low, there is not considered to be a pathway for operation and

maintenance phase underwater noise impacts to have the potential to cause perceptible changes to prey availability in such a way that could impact this SCI.

386. Similarly, as operational phase activities within the array site do not routinely require disturbance of the seabed (in the form of trenching or dredging activities) except within localised areas in which this is necessary to facilitate repairs, increased SSC levels, are considered to occur only potentially infrequently and locally during the operational phase and there is no perceptible pathway for this impact to have the potential to cause changes to prey availability during the operational phase in such a way that could impact this SCI.

387. Key fish species, upon which roseate tern predate, may experience the loss of up to 0.49 km^2 of previously available benthic habitat within the array site as a result of occupancy of the seabed by infrastructure during the operation and maintenance phase of the CWP Project. The spatial extent of such prey species habitat loss is, however, considered to be of negligible size in relation to this SCI's breeding and non-breeding season range extents.

388. During the operation and maintenance phase, one additional potential impact to seabird receptor prey species which does not occur during the construction phase is considered, namely EMF effects, associated with electricity passing along infrastructure cables. Any effects on fish are anticipated to occur within the immediate vicinity of the cable and effect levels are likely to be low in relation to background levels associated with the Earth's magnetic field. The magnitude of such impacts to potentially sensitive fish species are assessed as being very low. Consequently, there is not considered to be a pathway for operation and maintenance phase EMF impacts to have the potential to cause impacts to prey availability in such a way that could impact this SCI.

389. Despite the above potential pathway to impact in the form of benthic habitat loss, the area in which impacts to prey species availability may occur represents a negligible proportion of sea area within the foraging range of roseate tern breeding within South Dublin Bay and River Tolka Estuary (mean-maximum + 1. S.D. = 23.2 km, Woodward et al., 2019) and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

390. In the context of the extent of available habitat within foraging range of the SPA, the negligible proportion of that habitat in which potential impacts to prey species may occur, and that potential impacts to prey species may be of limited (if any) demographic consequence to their seabird predators, the scale of changes in prey availability impacts associated with operation and maintenance phase activities within the array site is considered to be negligible.

391. In particular, potential changes to prey availability resultant from operation and maintenance phase activities within the array site are not expected to perceptibly increase the energetic costs of foraging, or lead to reductions in offspring provisioning rates for the roseate tern SCI of South Dublin Bay and River Tolka Estuary in such a way as to affect demographic parameters. Accordingly, the level of impact is not considered capable of altering the availability of prey species in such a way as to result in a significant decline in the breeding population abundance of this SPA SCI.

392. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of this SPA SCI. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA.

Proposed mitigation

393. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

394. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

395. Roseate tern depredates a range of fish species, including sandeels, sprat and herring. Of its key prey species groups, sprat and herring are anticipated to be most impacted by underwater noise during the operation and maintenance phase. Operation and maintenance phase activities within the OECC intertidal landfall area which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Passage population (no significant decline); and
- Prey biomass available (so significant decline).

396. Following installation of the OECC through the intertidal zone from the transition zone to the TJBs at the landfall location, the operational nature of any buried infrastructure within South Dublin Bay and River Tolka Estuary SPA is passive. Any routine visual inspection of the OECC does not extend to buried infrastructure within the SPA.

397. It is possible that unplanned maintenance may be required on buried infrastructure within the SPA during the operational phase of the project. In relation to these Conservation Objective attributes any such unplanned maintenance activities have the potential to cause disturbance and displacement to roseate tern within the vicinity of the impacted area. It is considered, however, that any unplanned maintenance activities on buried infrastructure within South Dublin Bay during the operational phase of the project would be restricted in terms of their frequency, temporal duration and spatial scale.

398. The extent of intertidal areas (between MLWS and MHWS) within South Dublin Bay is approximately 21.94 km^2, within which approximately 0.16 km^2 (0.72%) are predicted to be disturbed during landfall cable installation (see **Chapter 4: Project Description; Section 4.8**). The scale of any maintenance to buried infrastructure carried out during the operation and maintenance phase will likely be considerably smaller than that during cable installation during the construction phase. As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during operation and maintenance activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

399. It is therefore considered that there is no potential for AESI to result from changes in prey availability during operation and maintenance phase activities within the OECC intertidal landfall area in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-1**.

Proposed mitigation

400. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

401. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

402. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**. With regards to changes in prey availability during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance impact 4 – Collision

Array site

Project-only assessment

403. During the operation and maintenance phase of the CWP Project the presence of operational WTGs within the array site may result in the mortality of this SCI from this SPA through the collision of individuals with turbine blades. Collision mortality has the potential to impact on the following Conservation Objective attribute and target for this SPA SCI:

- Passage population (no significant decline).

404. In relation to this Conservation Objective attribute, mortality resultant from collision with operational WTGs within the array site may directly affect the overall survival rate of this SPA SCI. Furthermore, collision mortality may also adversely affect the overall productivity rate of this SPA SCI through reductions to offspring provisioning rates and other parental care metrics. These potential consequences may compromise the ability of the SCI to maintain its population on a long-term basis.

405. No flight activity of roseate tern was recorded within the array site during baseline surveys (see **Appendix 10.5: Baseline Characterisation Report** of the EIAR). Consequently, CRM has not been undertaken for this species on the basis that flight densities within the array site are extremely low and that resultant mortality rates to this SCI would be negligible.

406. As additional mortality to this SPA SCI resulting from collision with operational WTGs is estimated to represent only a negligible potential increase to SPA baseline mortality rates, this impact is considered not to impede the overall objective of maintaining / restoring the favourable conservation condition of the SPA SCI. Specifically, collision mortality will not affect the population dynamics of the SCI in such a way as to compromise its ability to maintain itself on a long-term basis as a viable component of its natural habitats. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

407. No specific mitigation is proposed, or required, in respect of collision during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

408. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

409. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**. With regards to collision impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

2.2.4 Receptors 4 - 12: Light-bellied brent goose to redshank

410. Receptors 4–12 (**Table 2-1**) are grouped here as they are all migrant species that utilise the intertidal habitats; they also all have the same Conservation Objectives, attributes and targets.

Construction Phase Impacts

Construction phase impact 1 – Direct effects on habitat

OECC Intertidal landfall

Project-only assessment

411. Direct effects on habitat have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population trend (long term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

412. Impacts considered to be direct effects on habitat may arise as a consequence of activities which temporarily disturb areas of intertidal habitat which are utilised by ornithological SCIs. There is no direct loss or removal of intertidal habitat proposed by the CWP project. Direct effects to intertidal areas which may be utilised by birds for foraging and non-foraging behaviours (such as roosting, loafing and maintenance) are considered only to relate to the physical footprint of the proposed intertidal infrastructure and works (i.e., the intertidal cable route during construction and any infrastructure at the proposed landfall location).

413. In relation to the Conservation Objective attributes, construction in the OECC landfall area may temporarily reduce the areas in which individuals can undertake foraging or non-foraging behaviours. These impacts may affect energetic costs, which may in turn affect condition of individuals and survival rates.

414. The spatial extent of intertidal habitat within South Dublin Bay and River Tolka Estuary SPA is 21.94 km^2. Approximately 0.16 km^2 of intertidal habitat within South Dublin Bay is estimated to be subject to direct effects as a result of intertidal cable landfall activities (0.04 km^2 from open cut landfall cable duct installation, 0.006 km^2 from the cofferdam installation, and 0.11 km^2 from cable laying activities in the transition zone). This equates to approximately 0.72% of the total intertidal habitat area within the SPA being subject to temporary direct effects on habitat during the construction phase of the proposed intertidal landfall works.

415. Following the backfilling of any excavated sections of trenching and removal of any supporting vehicles and / or infrastructure, it is considered that the re-establishment of intertidal habitat available to birds for non-foraging activities would occur rapidly due to the dynamic nature of intertidal habitats within

South Dublin Bay. Any effects on the physical habitat around active intertidal construction loci would be brief, lasting less than several tidal cycles. Intertidal mudflats are considered resilient to isolated physical disturbances and can recover well (OSPAR, 2023).

416. Despite the above potential pathways to impact, in the context of the negligible proportion of intertidal habitat within the SPA which will be affected during construction and the short-term temporary nature of the effects on those habitats, the scale of direct effects on habitat within the OECC intertidal landfall area is considered to be negligible. In particular, the reduction in intertidal areas in which the SCIs frequent is not expected to give rise to energetic costs in such a way as to impact the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of impacting the population abundance sizes of these SCIs.

417. Similarly, temporary negligible short-term effects on the distribution of common tern roosting areas within the SPA will not constitute any significant decline in relation to this Conservation Objective attribute.

418. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of these SPA SCIs. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the South Dublin Bay and River Tolka Estuary SPA.

419. In relation to these Conservation Objective attributes for these SCIs (**Table 2-1**), there will be no potential for direct effects during the construction phase to adversely affect the population or distributions of these SPA SCIs in such a way as to result in AESI.

420. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to these SPA SCIs.

Proposed mitigation

421. No specific mitigation is proposed, or required, in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

422. As per project only assessment, above.

Project-only effect on site integrity conclusion for impact

423. The Conservation Objective and its attributes and targets for these SPA SCIs are presented in **Table 2-1**. With regards to direct effects on habitat impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for these SCIs and, in turn, that there is **no project-only AESI for these SPA SCIs.**

Construction phase impact 2 – Disturbance and displacement

Array site (barrier effects only)

Project-only assessment

424. Disturbance and displacement have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population trend (long term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

425. Disturbance and displacement impacts to these migrant SCIs arising from the array site during construction are limited to barrier effects, i.e. the possibility they need to fly around the turbines during their annual migrations.

426. For the purpose of this assessment disturbance and displacement impacts through barrier effects to migratory species are conservatively treated as being the same as during the operational phase (albeit spanning a much shorter duration than those during the operational phase; 16 months, from initial turbine erection to operational, compared to a 25-year operational lifespan – **Chapter 4: Project Description**).

427. For migratory species, one-off energetic costs associated with relatively small deviations (such as travelling around the array site, rather than straight through) during typically large migratory movements are considered to be inconsequential in relation to energy reserves recruited for migration (Masden et al., 2009).

428. Therefore, the potential magnitude of impact on birds that only migrate through the array site (including waders and estuarine waterbirds) is considered negligible.

429. Consequently, there is assessed to be no potential for AESI to result from disturbance and displacement in the form of barrier effects during the construction phase at the array site in relation to the Conservation Objectives and attributes and targets for these SCIs as stated in **Table 2-1**.

Proposed mitigation

430. No specific mitigation is proposed, or required, in respect of disturbance and displacement during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

431. As per project-only assessment, above.

OECC Intertidal landfall

Project-only assessment

432. Disturbance and displacement impacts to SCIs within intertidal areas during construction periods area assessed in relation to the potential for disturbance to result from:

- Acoustic stimuli (from piling activities within intertidal habitats and onshore up to and including installation of the TJBs – with piling activities occurring on up to a total of 26 days).
- Visual stimuli (from sequential cable laying activities, associated preparatory works and the installation of ancillary structures within intertidal habitats and onshore up to and including installation of the TJBs – including cable duct installation over a period of up to 18 weeks, coffer dam construction over a period of up to 6 weeks, tensioner platform installation over a total of 9 days, cable pull through intertidal areas over a total of up to 9 weeks and around a mid-support pontoon (floating parking platform for plant / machinery) which will be present in the intertidal zone throughout the construction period).

433. Acoustic and visual stimuli associated with any given construction activity during diurnal periods (i.e. outside periods in which receptors are nocturnally roosting) at any given time of year are predicted to, on average, impact numbers of each SCI species as shown in **Table 2-1**. These numbers of impacted individuals are compared to the average number of each species observed within the South Dublin Bay part of the South Dublin Bay and River Tolka Estuary SPA during all diurnal baseline surveys (as outlined in **Technical Appendix 10.5: Baseline Characterisation Report** of the EIAR) and the 10 year mean-peak of each species within the wider Dublin Bay I-WeBS recording area (which also includes North Bull Island SPA, taken from the Site Summary Table for 0U404 Dublin Bay: available at Site Summary Tables_S27 (caspio.com)) in order to ascertain whether construction phase disturbance and displacement impacts may adversely affect the population size and / or distribution of each SCI and thereby result in potential for AESI.

434. The rationale to determine average numbers of individuals predicted to be available to be impacted by disturbance and displacement effects from construction phase activities within the OECC intertidal landfall area is presented in Section 10.10.2 in **EIA Chapter 10: Ornithology**, with average numbers of each SCI recorded during baseline surveys and average numbers of each SCI impacted taken from Table 10-51 Section 10.10.2.

435. In all cases acoustic and visual disturbance predictions presented in **Table 2-7** are based upon the most potentially impactful cable installation scenario through the intertidal area for each receptor, either for cables being installed around a central alignment within the OECC intertidal landfall area (the preferred alignment scenario), or for cables installed with maximum separation distances within the OECC intertidal landfall area (the limit of deviation scenario).

436. Numbers and proportions of SCIs impacted by acoustic and / or visual disturbance within the OECC intertidal landfall study area have been calculated on the basis of information known about each species' sensitivity to acoustic and/or visual anthropogenic disturbance and areas which are predicted to be impacted by visual and/or acoustic disturbance during the construction phase of the CWP Project.

437. Species sensitivities are taken from Cutts et al. (2013) and are described below:

- Light-bellied brent goose is highly sensitive to both acoustic and visual disturbance;
- Oystercatcher are moderately sensitive to both acoustic and visual disturbance;
- Ringed plover are of low sensitivity to both acoustic and visual disturbance;
- Grey plover are moderately sensitive to both acoustic and visual disturbance;
- Knot are highly sensitive to acoustic and of low sensitivity to visual disturbance;
- Sanderling are of low sensitivity to both acoustic and visual disturbance;
- Dunlin are of low sensitivity to both acoustic and visual disturbance;
- Bar-tailed godwit are moderately sensitive to both acoustic and visual disturbance; and
- Redshank highly sensitive to acoustic and of low sensitivity to visual disturbance.

438. **Table 2-6** summarises acoustic and visual stimulus thresholds used to determine areas of impact to bird species at the levels to which they are sensitive.

Table 2-6: Acoustic and visual stimuli thresholds for disturbance (Cutts et al., 2013)

Disturbance level	Acoustic	Visual
High	Noise levels exceed 40dB	Within 500 m of stimulus
Moderate	Noise levels exceed 55 dB	Within 300 m of stimulus
Low	Noise levels exceed 70 dB	Within 100 m of stimulus

439. Where species occur within range of acoustic and visual disturbances at levels to which they are sensitive, they are considered to be available for disturbance. Using information available in relation to noise and visual impacts generated by activities associated with the CWP Project within the OECC intertidal landfall area, overlap between areas predicted to be subject to such impacts, as they are described in **Table 2-6**, have been assessed against occurrences of these SCIs as recorded within the OECC intertidal landfall study area during the baseline survey period (and against the I-WeBS 10 year mean peak count from 2011 / 12 to 2020 / 21), to give numbers and proportions of each SCI predicted to be impacted by acoustic and visual anthropogenic disturbance as they occur at levels to which these individual species are sensitive (**Table 2-7**).

440. In all cases, acoustic and visual disturbance predictions presented in **Table 2-12** are based upon the most potentially impactful cable installation scenario through the intertidal area for each receptor, either for cables being installed around a central alignment within the OECC intertidal landfall area (the preferred alignment scenario), or for cables installed with maximum separation distances within the OECC intertidal landfall area (the Alternative Alignment for the purposes of Modelling (AAM) scenario).

Table 2-7: Average numbers of each wintering waterfowl and wader SCI experiencing potential disturbance from acoustic and visual stimuli compared to average numbers present within the South Dublin Bay section of the South Dublin Bay and River Tolka Estuary SPA and mean peak numbers across the wider Dublin Bay I-WeBS recording area

SCI	Average number recorded during diurnal baseline surveys (across all 81 surveys)	Dublin Bay 10-year mean peak 2011/12–20/21	Acoustic Impacts			Visual Impacts		
			Average number experiencing disturbance from acoustic effects of single piling event	Average proportion of individuals recorded during diurnal baseline surveys impacted	Average proportion of Dublin Bay 10-year mean peak 2011/12–20/21 impacted	Average number experiencing disturbance from visual effects of all activities from intertidal cable landfall	Average proportion of individuals recorded during diurnal baseline surveys impacted	Average proportion of Dublin Bay 10-year mean peak 2011/12–20/21 impacted
Light-bellied brent goose	77.98	3747	19.93	25.56%	0.53%	23.18	29.73%	0.62%
Oystercatcher	861.19	3115	50.88	5.91%	1.63%	250.42	29.08%	8.04%
Ringed plover	33.14	168	0.01	0.13%	0.01%	4.36	13.16%	2.60%
Grey plover	3.07	342	0.22	7.19%	0.06%	1.1	35.85%	0.32%
Knot	775.28	6277	136.83	17.65%	2.18%	77.16	9.95%	1.23%
Sanderling	53.06	549	0.04	0.08%	0.01%	1.77	3.34%	0.32%
Dunlin	596.75	7603	1.74	0.29%	0.02%	160.17	26.84%	2.11%
Bar-tailed godwit	177.62	2119	4.26	2.4%	0.20%	24.69	13.9%	1.17%
Redshank	166.70	2166	54.48	32.68%	2.52%	26.74	16.04%	1.23%

441. For grey plover and sanderling, the average number of individuals assessed to be available to experience potential disturbance in relation to both acoustic and visual impacts during diurnal periods is very low (less than five individuals in all cases, which is <1% of the average number of individuals recorded during baseline surveys). As such, and in the capacity of being assessed on an ex situ basis, there is no potential for construction phase disturbance and displacement impacts to adversely affect the population or distributions of these SCIs of the South Dublin and River Tolka Estuary SPA in such a way as to result in AESI.

442. For light-bellied brent goose, oystercatcher, knot, dunlin, bar-tailed godwit, ringed plover and redshank, the average number of individuals assessed to experience potential disturbance during diurnal periods in relation to both or either acoustic or visual impacts is between 1 and 35.85% of the average number of individuals recorded during baseline surveys depending on species. As such, there is considered to be the potential for construction phase disturbance and displacement impacts to adversely affect the population and / or distributions of these SCIs of the South Dublin and River Tolka Estuary SPA in such a way as to result in AESI.

443. Unlike during diurnal periods, for which information relating to the ecological sensitivity of waders and waterfowl to visual and acoustic stimuli are available, disturbance responses of nocturnal roosting waders and waterfowl to such stimuli are unknown. As such, it is not possible to overlap disturbance effect ranges with receptor distributions to inform the assessment of potential disturbance and displacement impact magnitudes to roosting receptors for intertidal cable installation scenarios. It is therefore conservatively assumed that, should construction phase activities within intertidal areas of South Dublin and River Tolka Estuary SPA be conducted during nocturnal periods, whilst there is uncertainty on the magnitude of the impact, there is potential for AESI via disturbance and displacement impacts to light-bellied brent goose, oystercatcher, knot, dunlin, bar-tailed godwit, ringed plover and redshank SCIs and, furthermore, the potential for AESI via disturbance and displacement impacts to ringed plover, grey plover and sanderling may not be excluded.

Proposed mitigation

444. As intertidal habitats within South Dublin Bay are primarily used by these SCIs during their non-breeding periods as staging sites (stop-over locations within migratory flyways) or overwintering sites, mitigation in the form of a seasonal restriction to construction activities within (and surrounding) intertidal areas will be effective to ensure no AESI to these SCIs of the SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-1**.

445. Full details of this seasonal restriction additional mitigation are as follows:

- No construction phase cable route installation or associated activities, including preparatory works, will be undertaken within the South Dublin Bay area during the period of September to March, inclusive.
- This area corresponds with the extent of intertidal habitat (areas between MLWS and MHWS) within the South Dublin Bay part of the South Dublin Bay and River Tolka Estuary SPA, and also includes a small area of terrestrial habitat covering the Goose Green area at Poolbeg.

Residual impacts

446. With the implementation of mitigation as outlined above, given the very limited number of individuals potentially experiencing disturbance in relation to construction phase activities within intertidal areas of South Dublin and River Tolka Estuary SPA, there is no potential for AESI to result from such activities to the listed SCIs of the SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-1**.

447. Where construction works within intertidal areas are constrained to occurring within the April to August period (as outlined above), potential project only disturbance and displacement impacts are assessed as follows:

448. Acoustic and visual stimuli associated with any given piling event during diurnal periods (i.e. outside periods in which receptors are nocturnally roosting) during the April to August, inclusive, period are predicted to, on average, impact numbers of each SCI species, as shown in **Table 2-8**. These numbers of impacted individuals are compared to the average number of each species observed within the South Dublin Bay part of the South Dublin Bay and River Tolka Estuary SPA during diurnal baseline surveys throughout the year and the 10 year mean-peak of each species within the wider Dublin Bay I-WeBS recording area (which also includes North Bull Island SPA, taken from the Site Summary Table for 0U404 Dublin Bay: available at Site Summary Tables_S27 (caspio.com)) in order to ascertain whether post-mitigation construction phase disturbance and displacement impacts may adversely affect the population size and / or distribution of each SCI and thereby result in potential for AESI.

449. To determine the average numbers of individuals predicted to be impacted by disturbance and displacement effects from construction phase activities within the OECC intertidal landfall area, the average numbers of each SCI impacted in this period is related to the average numbers of each SCI recorded during baseline surveys between April and August, as presented in **Table 2-8** (see **Technical Appendix 10.6** of the EIAR for further information).

450. In all cases acoustic and visual disturbance predictions presented in **Table 2-8** are based upon the most potentially impactful cable installation scenario through the intertidal area for each receptor, either for cables being installed around a central alignment within the OECC intertidal landfall area (the preferred alignment (PA) scenario), or for cables installed with maximum separation distances within the OECC intertidal landfall area (AAM scenario)

451. Within the April to August period, the proportions of individuals of each SCI species available to acoustic and visual impacts are reduced (**Table 2-8**) to <1% in all cases, with the exception of oystercatcher, of which 7.56% of the 10-year mean peak count are predicted to be available to visual disturbance. Going by the relative metrics used to quantify proportional impacts to SCIs, this is considered to be “small” (i.e., between 5% and 10%). Furthermore, this proportion is further reduced to “very small” (4.55%) when assessed against the PA scenario as opposed to the maximal AAM scenario. As such there is no potential for construction phase disturbance and displacement impacts to adversely affect the population or distributions of these SCIs of the South Dublin and River Tolka Estuary SPA in such a way as to result in AESI.

Table 2-8: Average numbers of each wintering waterfowl and wader SCI experiencing potential disturbance from acoustic and visual stimuli should works be restricted to occurring between April and August, inclusive, compared to average numbers present within the South Dublin Bay section of the South Dublin Bay and River Tolka Estuary SPA throughout the year and annual mean peak numbers across the wider Dublin Bay I-WeBS recording area

SCI	Average number recorded during diurnal baseline surveys (across all 81 surveys)	Average number recorded during diurnal baseline surveys (across surveys during April to August period – 27 surveys)	Dublin Bay 10 year mean peak 2011/12–20/21	Acoustic Impacts			Visual Impacts		
				Average number experiencing disturbance from acoustic effects of single piling event (across surveys during April to August period – 27 surveys)	Average proportion of individuals recorded during diurnal baseline surveys impacted (across all 81 surveys)	Average proportion of Dublin Bay 10 year mean peak 2011/12–20/21 impacted	Average number experiencing disturbance from visual effects of all activities from intertidal cable landfall (across surveys during April to August period – 27 surveys)	Average proportion of individuals recorded during diurnal baseline surveys impacted (across all 81 surveys)	Average proportion of Dublin Bay 10 year mean peak 2011/12–20/21 impacted
Light-bellied brent goose	77.98	18.26	3747	10.2	13.08%	0.27%	16.64	21.34%	0.44%
Oystercatcher	861.19	295.63	3115	12.71	1.48%	0.41%	235.43	27.34%	7.56%
Ringed plover	33.14	0.00	168	0.00	0.00%	0.00%	0.78	2.35%	0.46%
Grey plover	3.07	0.00	342	0.00	0.00%	0.00%	0.00	0.00%	0.00%
Knot	775.28	0.00	6277	0.00	0.00%	0.00%	0.00	0.00%	0.00%
Sanderling	53.06	3.56	549	<0.01	0.01%	0.00%	0.08	0.15%	0.01%
Dunlin	596.75	0.00	7603	0.00	0.00%	0.00%	0.00	0.00%	0.00%
Bar-tailed godwit	177.62	33.04	2119	0.11	0.06%	0.01%	0.74	0.42%	0.03%
Redshank	166.70	21.07	2166	1.62	0.97%	0.07%	1.31	0.78%	0.06%

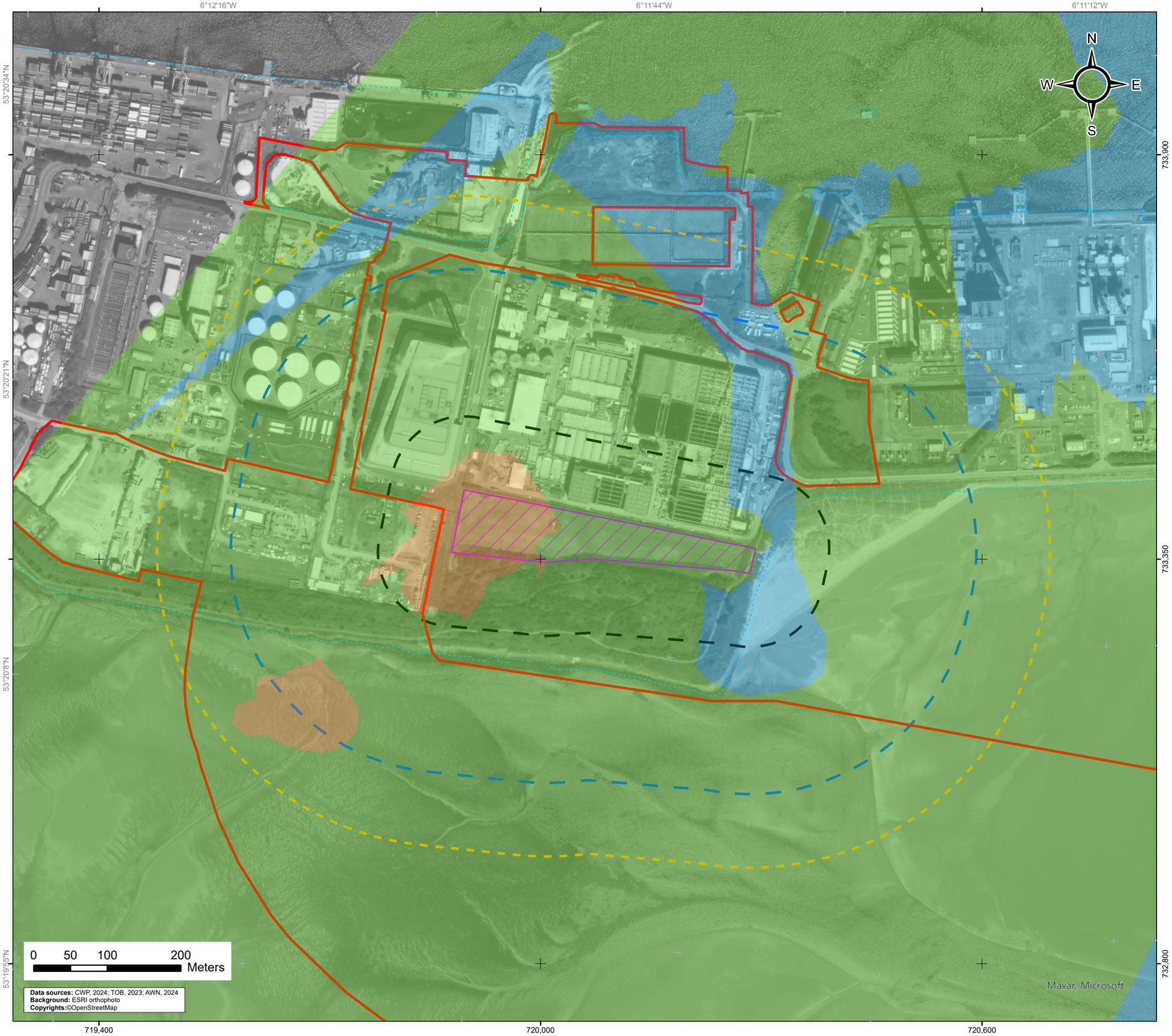
Onshore Infrastructure [Light-bellied brent goose on terrestrial habitat only]

Project-only assessment

452. The light-bellied brent goose SCI of South Dublin Bay and River Tolka Estuary SPA has been assessed as being at risk from disturbance and displacement from onshore infrastructure construction to the terrestrial areas of the SPA, following a precautionary approach. Although light-bellied brent goose was irregularly recorded during onshore surveys, the species was observed foraging in the grassland area known as 'Goose Green', to the north of the Irishtown Nature Park, which also forms part of the South Dublin Bay and River Tolka Estuary SPA (approximately 150 m from the landfall area).

453. Construction activity at the landfall area, onshore export cable and the ESB network cables has been determined to result in the highest level of disturbance (ranging from118 dB at source for HDD activities for the ESBN network connection and 113 dB at source for tunnel excavation). Combined with the overall duration of works which will be 21 months for tunnelling and 3–4 months for HDD works, involving site clearance, installation and reinstatement works, movement of machinery and lighting, disturbance and displacement of this SCI cannot be ruled out.

454. Light-bellied Brent Geese are highly sensitive to noise and visual disturbances of various degrees (Cutts et al*.,* 2013). Noise modelling has been prepared, and a noise contour figure has been produced, showing the noise and disturbance level predicted relative to light-bellied brent goose tolerance (**Figure 2-6**). The sound propagation contours range from high (>70 dB), medium (55–70 db) and low (40–55 db) levels of disturbance, with noise below 40 dB considered existing background levels. As illustrated in **Figure 2-6**, the western portion of Goose Green along with a small section of the eastern portion, which forms part of the South Dublin Bay and River Tolka Estuary SPA, is predicted to experience medium levels of disturbance, decreasing to low levels to the centre of Goose Green. This medium level of disturbance has the potential to adversely affect the light-bellied brent geese, potentially displacing them from the western and eastern areas of Goose Green. However, due to the low number of birds likely to be using Goose Green, and the availability of alternative habitats in the area, any change in population distribution due to disturbance effects is expected to be on a small scale and is not predicted to significantly impact the long-term viability of the population. Recovery from this change is anticipated to be achieved in the short term after the end of the project activity. Nevertheless, taking a precautionary approach and in the absence of mitigation measures, there is potential for a level of impact considered capable of resulting in a significant decline in the range, timing or intensity of use of the terrestrial areas by light-bellied brent goose. As such, the CWP Project would impede the overall objective of maintaining the favourable conservation condition of light-bellied brent goose in the SPA. Therefore, there is potential that the CWP Project will give rise to **an AESI on the South Dublin Bay and River Tolka Estuary SPA.**



Legend

- Planning application boundary
- High water mark
- Goose green area - South Dublin bay and river Tolka estuary SPA

Goose green buffers

- 100 m
- 300 m
- 400 m

Noise model for the onshore export cables installation (without mitigation)

- Background: 0 – 40 dB
- Low: 40 – 55 dB
- Medium: 55 – 70 dB

codling wind park

Project: Codling Wind Park

Contractor: TOBIN

Website: www.tobin.ie

Figure 2.6
Noise model for onshore export cables tunnel installation activities (without mitigation)

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1697

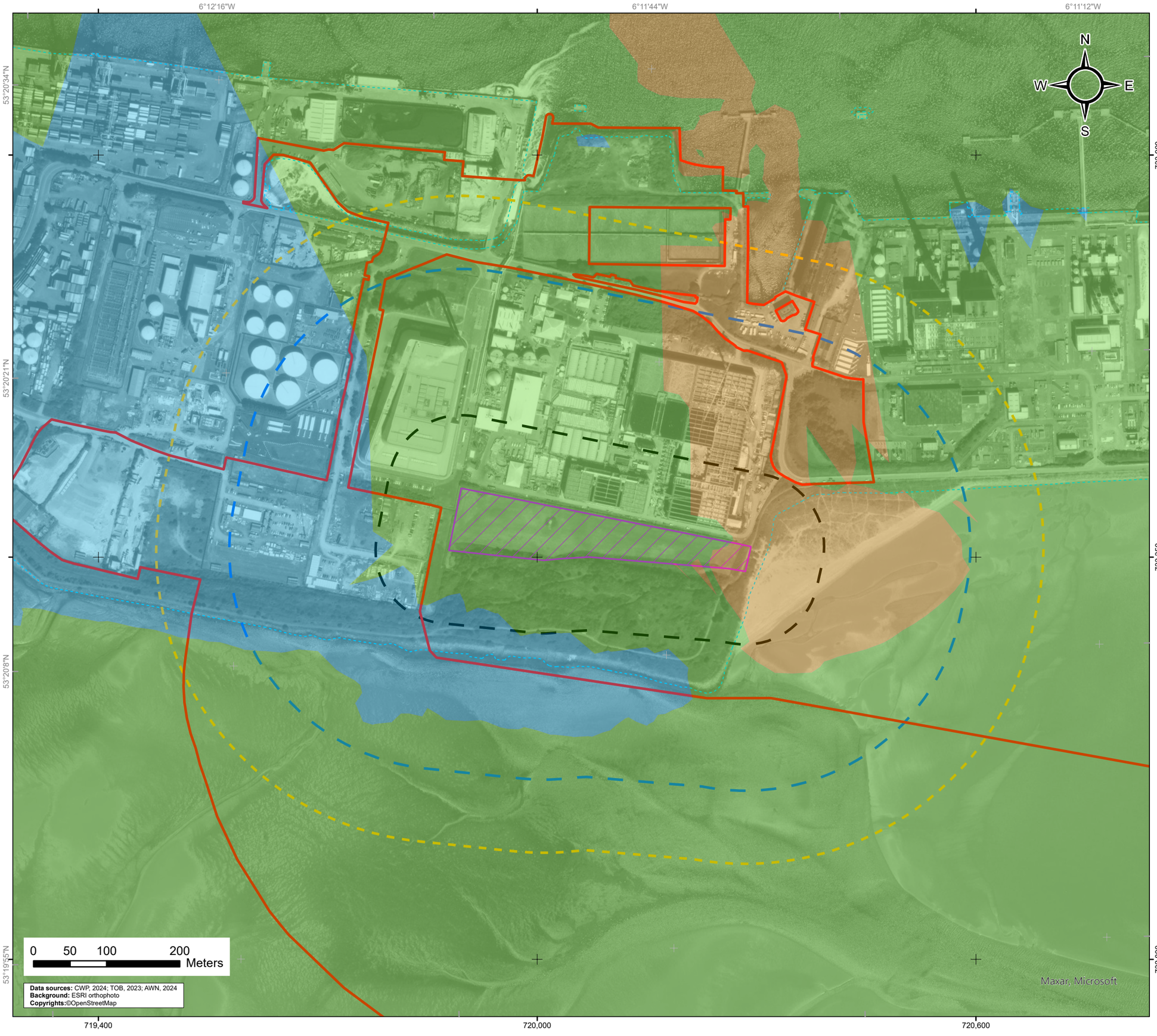
Internal descriptive code: PB - PAB..T.NOISE.MODEL- HWM..S.D.BUY.and .RIV.TOLKA.SPA.ONSH.BUFF.100m.300m.400m - (NIS.Vol.05.a.Sec.02.FIG.06)

Size: A3

Scale: 1:5,000

CRS: EPSG 2157

Rev.	Updates	Date	By	Chk'd	App'd
00	Final for issue	2024/08/19	SP	DM/EA	ES



Legend

- Planning application boundary
- High water mark
- Goose green area - South Dublin bay and river Tolka estuary SPA

Goose green buffers

- 100 m
- 300 m
- 400 m

Noise model for the network cables installation (without mitigation)

- Background: 0 – 40 dB
- Low: 40 – 55 dB
- Medium: 55 – 70 dB

codling wind park

Project: Codling Wind Park

Contractor: TOBIN

Website: www.tobin.ie

Figure 2.7
Noise model for ESBN network cables installation activities (without mitigation)

CWP doc. number: CWP-NPC-ENG-08-01-MAP-1698

Internal descriptive code: PB - PAB..ENC.NOISE.MODEL- HWM..S.D.BUY .and.RIV.TOLKA.SPA.ONSH.BUFF.100m.300m.400m - (NIS.Vol.05.a.Sec.02.FIG.07)

Size: A3

Scale: 1:5,000

CRS: EPSG 2157

Rev.	Updates	Date	By	Chk'd	App'd
00	Final for issue	2024/08/19	SP	DM/EA	ES

Proposed mitigation

455. Construction noise will be kept to a minimum, in accordance with British Standard BS 5228 1:2009 'Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise', to reduce the level of noise during the construction phase. The appointed contractor will be obliged to take specific noise abatement measures and will comply with the best practice measures outlined in BS 5228 and the NRA guidelines '*Good practice Guideline for the Treatment of Noise during the Planning of National Road Schemes*' (NRA, 2014), which although are designed for road schemes is applicable to the CWP Project, due to the machinery and numbers of personnel to be involved.

456. To reduce the level of artificial lighting, all temporary lighting associated with the construction works will be placed strategically by the appointed Contractor following consultation with the appointed ECoW. This will ensure that illumination beyond the works area is controlled. Lighting will be cowled and directional to reduce significant light splay.

457. To reduce the level of noise disturbance from construction activities, the following will be undertaken:

- 2.6 m localised screening will be erected around noisy plant sources associated with the open cut excavation including piling works at the temporary cofferdam, tunnel excavation works (within the Compound A) and the HDD installation of the ESBN networks cables;
- 2.6 m hoarding will be erected around the perimeter of the temporary tunnel compound, located in Compound A and the temporary HDD compound located in Compound C; and
- 2.6 m high perimeter hoarding will also be erected around the boundaries of Compound A and Compound C.

458. Following the implementation of this mitigation, noise contours presented below demonstrate that the noise levels from these construction activities will be at levels between 40-55 dB across all of Goose Green, for both the tunnel excavations (**Figure 2-8**) and the HDD installation for the ESBN network cables (**Figure 2-9**) which is considered to be at a low level (Cutts et al., 2013).

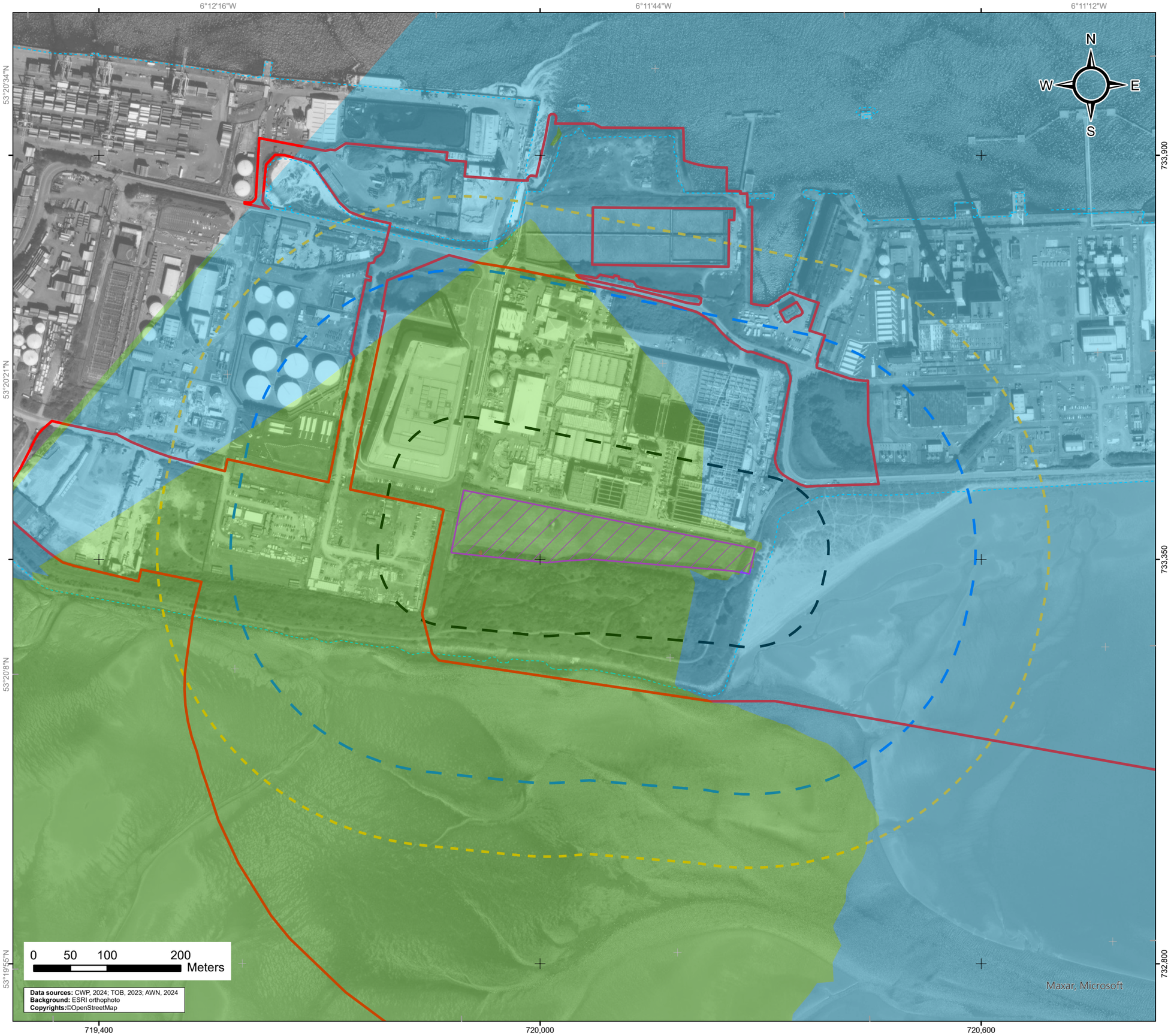
459. To reduce noise and visual disturbance on the area known as 'Goose Green' and on any potential light-bellied brent goose within the area, construction hoarding will be erected around the perimeter of construction compound A and the perimeter of construction compound C for the duration of the construction phase, which will ensure no visual disturbance and reduce further any potential noise to the light-bellied brent goose.

Residual impacts

460. With the application of the above proposed mitigation measures, it has been assessed that there is no potential for AESI to result from disturbance and displacement during the construction phase within the onshore development area, in relation to the Conservation Objectives and attributes and targets for this SCI within the South Dublin Bay and River Tolka Estuary SPA. The proposed mitigation will not impede on the distribution of light-bellied brent goose within the terrestrial area of the SPA and therefore not impact on the Conservation Objectives for the species.

Project-only effect on site integrity conclusion for impact

461. The Conservation Objective and its attributes and targets for these SPA SCIs are presented in **Table 2-1**. With regards to disturbance and displacement impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for these SCIs and, in turn, that there is **no project-only AESI for these SPA SCIs**



Legend

- Planning application boundary
- High water mark
- Goose green area - South Dublin bay and river Tolka estuary SPA

Goose green buffers

- 100 m
- 300 m
- 400 m

Noise model for onshore export cables tunnel installation activities (including mitigation)

- Background: 0 – 40 dB
- Low: 40 – 55 dB
- Medium: 55 – 70 dB

codling wind park

Project: Codling Wind Park

Contractor: TOBIN

Website: www.tobin.ie

Figure 2.8
Noise model for onshore export cables tunnel installation activities including mitigation

CWP doc. number: CWP-TOB-ENG-08-01-MAP-1752

Internal descriptive code: PB - PAB..T.NOISE.MODEL.MIT - HWM..S.D.BUY.and.RIV.TOLKA.SPA.ONSH.BUFF.100m.300m.400m - (NIS.Vol.05.a.Sec.02.FIG.08)

Size: A3

Scale: 1:5,000

CRS: EPSG 2157

Rev.	Updates	Date	By	Chk'd	App'd
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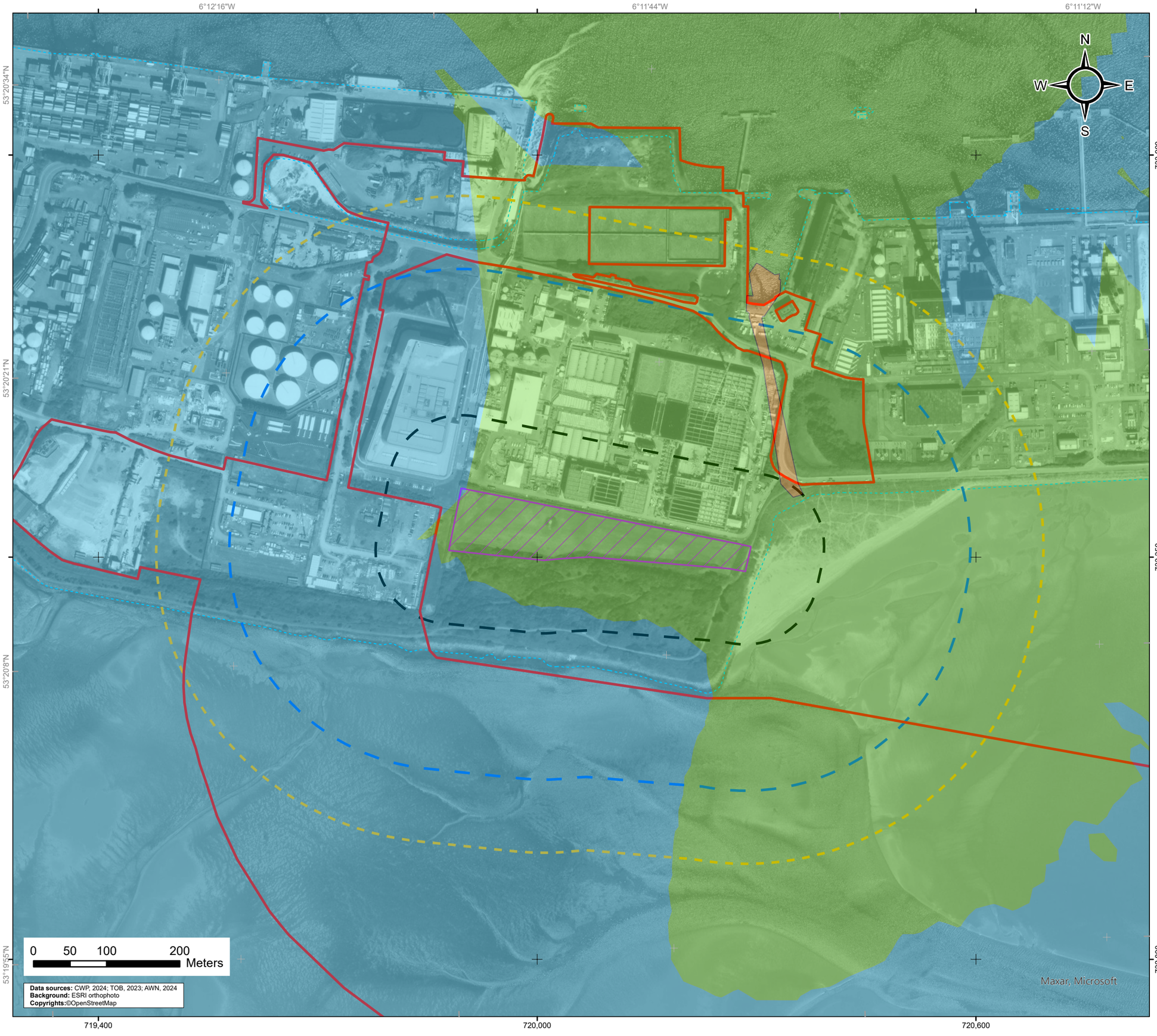

Legend

- Planning application boundary
- High water mark
- Goose green area - South Dublin bay and river Tolka estuary SPA

Goose green buffers

- 100 m
- 300 m
- 400 m

Noise model for the network cables installation (including mitigation)

- Background: 0 – 40 dB
- Low: 40 – 55 dB
- Medium: 55 – 70 dB

codling wind park

Project: Codling Wind Park

Contractor: TOBIN

Website: www.tobin.ie

Figure 2.9
Noise model for ESBN network cables installation activities including mitigation

CWP doc. number: CWP-TOB-ENG-08-01-MAP-1753

Internal descriptive code: PB - PAB..ENC.NOISE.MODEL.MIT - HWM..S.D.BUY .and.RIV.TOLKA.SPA.ONSH.BUFF.100m.300m.400m - (NIS.Vol.05.a.Sec.02.FIG.09)

Size: A3

Scale: 1:5,000

CRS: EPSG 2157

Rev.	Updates	Date	By	Chk'd	App'd
00	Final for issue	2024/08/19	SP	DM/EA	ES

Construction phase impact 3 – Changes in prey availability

OECC Intertidal landfall

Project-only assessment

462. Changes in prey availability have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population trend (long term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

463. Prey species upon which each of these wintering ornithological SCIs rely include invertebrates such as molluscs (including bivalves) and annelids (including polychaetes). The alteration of habitats which support the prey species of intertidal waterbirds (e.g., during preparation of the seabed for trenching and cabling activities, the burial of export cables within the intertidal zone and the presence of infrastructure footprints within the intertidal zone) have the potential to change the distribution, behaviour or accessibility of prey species for intertidal waterbirds through:

a. Increased suspended sediment levels may alter the distribution of fish and mobile invertebrate species should they respond to avoid areas of altered water column condition.

b. Alteration of habitats which support seabird prey species may reduce the capacity of those habitats to hold or produce intertidal waterbird prey species, thereby reducing the abundance of prey available to foraging intertidal waterbirds within and around impacted areas.

464. The extent of intertidal areas (between MLWS and MHWS) within South Dublin Bay is approximately 21.94 km^2, within which approximately 0.16 km^2 (0.72%) are predicted to be disturbed during landfall cable installation (**Chapter 4: Project Description**; **Section 4.8**). As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during construction activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

465. It is therefore considered that there is no potential for AESI to result from changes in prey availability during construction phase activities within the OECC intertidal landfall area in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-1**.

Proposed mitigation

466. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

467. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

468. The Conservation Objective and its attributes and targets for these SPA SCIs are presented in **Table 2-1**. With regards to changes in prey availability impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for these SCIs and, in turn, that there is **no project-only AESI for these SPA SCIs.**

Operation and Maintenance Phase Impacts

Operation and maintenance impact 1 – Direct effects on habitat

OECC Intertidal landfall

Project-only assessment

469. Impacts considered to be direct effects on habitat may arise as a consequence of maintenance activities which temporarily remove or alter areas of intertidal habitat which are utilised by these SCIs. Cable landfall duct maintenance activities and potential cable repair works during the operation and maintenance phase within South Dublin Bay have the potential to alter areas of intertidal habitat such that they become temporarily unavailable to these SCIs connected with South Dublin Bay and River Tolka Estuary SPA, which may otherwise utilise those areas for non-foraging behaviours.

470. Direct effects on habitat have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population trend (long term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

471. In relation to these Conservation Objective attributes, operation and maintenance of the CWP Project OECC intertidal landfall may result in temporary reductions in the spatial extent of the intertidal areas within South Dublin Bay in which individuals from South Dublin Bay and River Tolka Estuary SPA can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of operation and maintenance phase activities within the OECC intertidal landfall may directly affect demographic parameters (for example, use of alternative roosting areas may increase vulnerability to predation and reduce survival rates), or may affect the energetic costs of non-foraging behaviours through increased occupancy of sub-optimal area and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

472. Despite the above potential pathways to impact, as the spatial extent of any temporary direct effects on intertidal habitats from maintenance activities will be, at most extremely localised, should extraction and reinstatement of intertidal areas be required, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the populations of these SCIs of South Dublin Bay and River Tolka Estuary SPA. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation conditions of these SCIs of South Dublin Bay and River Tolka Estuary SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to South Dublin Bay and River Tolka Estuary SPA.

Proposed mitigation

473. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

474. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

475. The Conservation Objective and its attributes and targets for these SPA SCIs are presented in **Table 2-1**. With regards to direct effects on habitat impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for these SCIs and, in turn, that there is **no project-only AESI for these SPA SCIs.**

Operation and maintenance phase impact 2 – Disturbance and displacement

Array site (barrier effects only)

Project-only assessment

476. Disturbance and displacement have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population trend (long term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

477. Disturbance and displacement impacts to these migrant SCIs arising from the array site during the operation and maintenance phase are limited to barrier effects, i.e., the possibility they need to fly around the turbines during their annual migrations.

478. For migratory species, one-off energetic costs associated with relatively small deviations (such as travelling around the array site, rather than straight through) during typically large migratory movements are considered to be inconsequential in relation to energy reserves recruited for migration (Masden et al., 2009).

479. Therefore, the potential magnitude of impact on birds that only migrate through the array site (including waders and estuarine waterbirds) is considered negligible.

480. Consequently, there is assessed to be no potential for AESI to result from disturbance and displacement in the form of barrier effects during the operation and maintenance phase at the array site in relation to the Conservation Objectives and attributes and targets for these SCIs as stated in **Table 2-1**.

Proposed mitigation

481. No specific mitigation is proposed, or required, in respect of disturbance and displacement during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

482. As per project-only assessment, above.

OECC Intertidal landfall

Project-only assessment

483. Following installation of the OECC through the intertidal zone from the transition zone to the TJBs at the landfall location, the operational nature of any buried infrastructure within South Dublin Bay and River Tolka Estuary SPA is passive. Any routine visual inspection of the OECC does not extend to buried infrastructure within the SPA.

484. It is possible that unplanned maintenance may be required on buried infrastructure within the SPA during the operational phase of the project. In relation to these Conservation Objective attributes, any such unplanned maintenance activities have the potential to cause disturbance and displacement to common tern within the vicinity of the impacted area. It is considered, however, that any unplanned maintenance activities on buried infrastructure within South Dublin Bay during the operational phase of the project would be restricted in terms of their frequency, temporal duration and spatial scale, resulting in discrete areas of a visual disturbance of ~250m radius.

485. Given the extent of intertidal habitat available to the SCIs, the short temporal duration of any unplanned maintenance activities and the passive nature of the operation of buried infrastructure within South Dublin Bay and River Tolka Estuary SPA, it is considered such that there is no potential for AESI to these SCIs as a result of disturbance and displacement impacts during the operation and maintenance phase around the OECC intertidal landfall in relation to the Conservation Objectives, attributes and targets outlined in **Table 2-1**.

Proposed mitigation

486. No specific mitigation is proposed, or required, in respect of disturbance and displacement during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

487. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

488. The Conservation Objective and its attributes and targets for these SPA SCIs are presented in **Table 2-1**. With regards to disturbance and displacement impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for these SCIs and, in turn, that there is **no project-only AESI for these SPA SCIs.**

Operation and maintenance phase impact 3 – Changes in prey availability

OECC Intertidal landfall

Project-only assessment

489. Changes in prey availability have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population trend (long-term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

490. The Conservation Objective attributes have the potential to be impacted through a reduction in prey availability due to:

a. Increased suspended sediment levels may temporarily alter the distribution of fish and mobile invertebrate species should they respond to avoid areas of altered water column condition.

b. Alteration of habitats which support prey species may reduce the capacity of those habitats to hold or produce prey species, thereby reducing the abundance of prey available to foraging seabirds within and around impacted areas.

491. The extent of intertidal areas (between MLWS and MHWS) within South Dublin Bay is approximately 21.94 km^2, within which approximately 0.16 km^2 (0.72%) are predicted to be disturbed during landfall cable installation (**Chapter 4: Project Description**; **Section 4.8**). The scale of any maintenance to buried infrastructure carried out during the operation and maintenance phase will likely be considerably smaller than that during cable installation during the construction phase. As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during operation and maintenance activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

492. It is therefore considered that there is no potential for AESI to result from changes in prey availability during operation and maintenance phase activities within the OECC intertidal landfall area in relation to the Conservation Objective and attributes and targets for these SCIs as stated in **Table 2-1**.

Proposed mitigation

493. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

494. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

495. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**. With regards to changes in prey availability during the operation and maintenance phase of the

CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance impact 4 – Collision

Array site

Project-only assessment

496. Collision impacts have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population trend (long term population trend stable or increasing).

497. Estimated collision mortality for these non-breeding wader and waterbird SCIs of South Dublin Bay and River Tolka Estuary SPA, which may pass through the array site during migratory movements, are presented in **Table 2-9**. These values are derived from total collision mortality figures for each species (as determined in **Appendix 10.3 Collision Risk Modelling** of the EIAR), apportioned on the basis of the SPA population (a 10-year mean-peak – 2011 / 12–20 / 21 from the I-WeBS Site Summary Table for 0U404 Dublin Bay [available at Site Summary Tables_S27 (caspio.com)]) as a proportion of the wider regional flyway population (Burke et al., 2019).

498. For example, for regional migratory CRM, total collision mortality impacts to light-bellied brent goose are estimated as 0.04 per annum. As the annual mean-peak population of this SCI in the Dublin Bay area is 10.66% of the all-Ireland regional population, of the 0.04 collision mortalities per annum, a total 0.004 (10.66%) collision mortalities per annum are apportioned to the South Dublin Bay and River Tolka Estuary SPA light-bellied brent goose population. This then translates to an increase in baseline mortality of <0.001%.

499. Additional mortalities apportioned to South Dublin Bay and River Tolka Estuary SPA were then compared to mean-peak populations of each SCI within the wider Dublin Bay I-WeBS area to ascertain whether additional mortality may result in AESI.

Table 2-9: Total annual collision mortalities to wildfowl and wader SCIs of South Dublin Bay and River Tolka Estuary SPA, mortalities apportioned to SPA for each SCI, and apportioned collision mortalities as a proportion of the Dublin Bay 10-year mean-peak I-WeBS counts for each SCI

SCI	10-year mean-peak I-WeBS count 2011/12–20/21	Regional population (All Ireland)	Proportion of regional population	Total impact		Impact apportioned to SPA		Impact as proportion of Dublin Bay I-WeBS area mean peak	
				Option A	Option B	Option A	Option B	Option A	Option B
Light-bellied brent goose	3747	35150	10.66%	0.04	0.035	0.004	0.004	0.000%	0.000%
Oystercatcher	3115	60540	5.15%	0.25	0.217	0.013	0.011	0.000%	0.000%
Ringed plover	168	11660	1.44%	0.061	0.054	0.001	0.001	0.001%	0.000%
Grey plover	342	2940	11.63%	0.004	0.004	0.000	0.000	0.000%	0.000%
Knot	6277	16270	38.58%	0.109	0.097	0.042	0.037	0.001%	0.001%
Sanderling	549	8420	6.52%	0.055	0.049	0.004	0.003	0.001%	0.001%
Dunlin	7603	45760	16.61%	0.617	0.549	0.103	0.091	0.001%	0.001%
Bar-tailed godwit	2119	16530	12.82%	0.01	0.008	0.001	0.001	0.000%	0.000%
Redshank	2166	23800	9.10%	0.147	0.129	0.013	0.012	0.001%	0.001%

500. Although these migratory wildfowl and wader SCIs from South Dublin Bay and River Tolka Estuary SPA may pass through the array site, any collision mortality to these SCIs would be negligible (0.001% or less than Dublin Bay 10 year mean peak counts). Collision impacts will therefore not result in an AESI in relation to the Conservation Objective and attributes and targets for these SCIs as stated in, **Table 2-1**. Specifically, any such negligible increase to baseline mortality is considered not to affect the long-term population trend of these SCIs in such a way as to result in its decline. Thereby, collision impacts to these SCIs of South Dublin Bay and River Tolka Estuary SPA will not adversely affect the Conservation Objectives of the SPA to maintain the favourable conservation condition of the SCIs.

Proposed mitigation

501. No specific mitigation is proposed, or required, in respect of collision during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

502. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

503. The Conservation Objective and its attributes and targets for these SPA SCIs are presented in **Table 2-1**. With regards to collision impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for these SCIs and, in turn, that there is **no project-only AESI for these SPA SCIs.**

2.2.5 Receptor 13: Black-headed gull

Construction Phase Impacts

Construction phase impact 1 – Direct effects on habitat

Array site

Project-only assessment

504. With regards to the array site, relevant construction phase direct effects on habitat relate to the alteration of sea surface areas as they become occupied by the footprint of installed infrastructure and, therefore, unavailable for use by seabird SCIs to undertake non-foraging behaviours.

505. As construction of the array site progresses through its planned duration of approximately 2.5 years, the above sea level spatial extent of infrastructure will increase to a maximum of less than 0.005 km^2 within the array site (i.e., combined sea level area of all WTGs and OSSs). This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population trend (long-term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

506. In relation to these Conservation Objective attributes, construction within the array site may reduce the marine areas in which individuals can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of construction phase activities within the array site may affect the energetic costs of non-foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

507. Given its designation as a wintering feature, the black-headed gull SCI of the South Dublin Bay and River Tolka Estuary SPA is not functionally connected to the array site, i.e., it is not a central-place forager during the non-breeding period. Non-breeding season black-headed gulls are more widely dispersed within the marine environment, utilising a significantly larger regional extent of sea area than during the breeding season. The spatial extent of less than 0.005 km^2 of above sea level infrastructure within the array area represents a tiny proportion of the marine areas utilised by this receptor during the non-breeding period.

508. In the context of the area of available habitat, and the negligible area that will be lost within the array site during construction, the scale of direct effects on habitat within the array site is considered to be negligible.

509. When considering the Conservation Objectives it is assessed that there will be no potential for construction phase direct effects on habitat to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

510. No specific mitigation is proposed, or required, in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

511. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

512. Impacts considered to be direct effects on habitat may arise as a consequence of activities which temporarily disturb areas of intertidal habitat which are utilised by ornithological SCIs. There is no direct loss or removal of intertidal habitat proposed by the CWP project. Direct effects to intertidal areas which may be utilised by birds for non-foraging behaviours (such as roosting, loafing and maintenance) are considered only to relate to the physical footprint of the proposed intertidal infrastructure and works (i.e., the intertidal cable route during construction and any infrastructure at the proposed landfall location).

513. Direct effects on intertidal habitat have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population trend (long term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

514. In relation to these Conservation Objective attributes, construction in the OECC landfall area may temporarily reduce the areas in which individuals can undertake non-foraging behaviours (such as roosting) or require individuals to use alternative areas for these non-foraging behaviours. These impacts may affect energetic costs of non-foraging behaviours, which may in turn affect condition of individuals and survival rates.

515. The spatial extent of intertidal habitat within South Dublin Bay and River Tolka Estuary SPA is 21.94 km^2. Approximately 0.16 km^2 of intertidal habitat within South Dublin Bay is estimated to be subject to direct effects as a result of intertidal cable landfall activities (0.04 km^2 from open cut landfall cable duct installation, 0.006 km^2 from cofferdam installation, and 0.11 km^2 from cable laying activities in the transition zone). This equates to approximately 0.72% of the total intertidal habitat area within the SPA being subject to temporary direct effects on habitat during the construction phase of the proposed intertidal landfall works.

516. Following the backfilling of any excavated sections of trenching and removal of any supporting vehicles and / or infrastructure, it is considered that the re-establishment of intertidal habitat available to birds for non-foraging activities would occur rapidly due to the dynamic nature of intertidal habitats within South Dublin Bay. Any effects on the physical habitat around active intertidal construction loci would be brief, lasting less than several tidal cycles. Intertidal mudflats are considered resilient to isolated physical disturbances and can recover well (OSPAR, 2023).

517. The total area anticipated to be subject to temporary direct effects on habitat during the construction phase of the proposed intertidal landfall works equates to 0.72% of the intertidal SPA habitat available to black-headed gulls. Given this proportion will be even smaller at any given moment in time during trenching activities, and given the rate of recoverability of available habitat following backfilling and removal of supporting infrastructure and / or vehicles, there will be no potential for construction phase disturbance and displacement impacts to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI.

518. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

519. No specific mitigation is proposed, or required, in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

520. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

521. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**. With regards to direct effects on habitat impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Construction phase impact 2 – Disturbance and displacement

OECC (Intertidal landfall)

Project-only assessment

522. Disturbance and displacement have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population trend (long-term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

523. In relation to these Conservation Objective attributes, construction within the OECC intertidal landfall area may temporarily reduce the areas in which individuals can undertake foraging or non-foraging behaviours (such as roosting). These impacts may affect energetic costs of such behaviours, which may in turn affect condition of individuals and survival rates.

524. Disturbance and displacement impacts to the black-headed gull SCI within intertidal areas of South Dublin Bay and River Tolka Estuary SPA during construction periods area assessed in relation to the potential for disturbance to result from acoustic and visual stimuli as per described for wader and waterbird SCIs in **Section 2.2.4**[2].

525. Acoustic and visual stimuli associated with any given construction activity during diurnal periods (i.e. outside periods in which receptors are nocturnally roosting) at any given time of year are predicted to, on average, impact numbers of black-headed gull as shown in **Table 2-10**. These numbers of impacted individuals are compared to the average number of each species observed within the South Dublin Bay part of the South Dublin Bay and River Tolka Estuary SPA during all diurnal baseline surveys (as outlined in **Technical Appendix 10.5: Baseline Characterisation Report** of the EIAR) and the 10 year mean-peak of each species within the wider Dublin Bay I-WeBs recording area (which also includes North Bull Island SPA, taken from the Site Summary Table for 0U404 Dublin Bay: available at Site Summary Tables_S27 (caspio.com)) in order to ascertain whether construction phase disturbance and displacement impacts may adversely affect the population size and/or distribution of this SCI and thereby result in potential for AESI.

526. As with the assessment of acoustic and visual anthropogenic disturbance which was carried out for wader and waterbird SCIs of South Dublin Bay and River Tolka Estuary SPA, numbers and proportions of the black-headed gull SCI impacted by acoustic and / or visual disturbance within the OECC intertidal landfall study area have been calculated on the basis of information known about this species' sensitivity to acoustic and/or visual anthropogenic disturbance and areas which are predicted to be impacted by visual and/or acoustic disturbance during the construction phase of the CWP Project.

527. Black-headed gull is considered to be of low sensitivity to visual and acoustic disturbance impacts (Goodship & Furness, 2019). Acoustic and visual stimulus thresholds (i.e., the noise levels generated by and distances from disturbance-inducing anthropogenic activities to which ornithological receptors may react to their species-specific sensitivity levels) are provided in **Table 2-6**, **Section 2.2.4**.

528. Using information available in relation to noise and visual impacts generated by activities associated with the CWP Project within the OECC intertidal landfall area, overlap between areas predicted to be subject to such impacts, as they are described in **Table 2-6**, **Section 2.2.4**, have been assessed against occurrences of the black-headed gull SCI as recorded within the OECC intertidal landfall study

[2] A full account of the disturbance and displacement assessment carried out for intertidal waterbirds is provided in **EIA Chapter 10: Ornithology – Section 10.10.2**.

area during the baseline survey period (and against the I-WeBS 10-year mean peak count from 2011 / 12 to 2020 / 21), to give numbers and proportions of this SCI predicted to be impacted by acoustic and visual anthropogenic disturbance as it occurs at levels to which this species is sensitive (**Table 2-10**).

529. In the case of the black-headed gull SCI of South Dublin Bay and River Tolka Estuary SPA, acoustic and visual disturbance predictions presented in **Table 2-10** are based upon the most potentially impactful cable installation scenario through the intertidal area for this receptor, either for cables being installed around a central alignment within the OECC intertidal landfall area (the preferred alignment scenario), or for cables installed with maximum separation distances within the OECC intertidal landfall area (AAM scenario).

Table 2-10: Average numbers of black-headed gull experiencing potential disturbance from acoustic and visual stimuli compared to average numbers present within the South Dublin Bay section of the South Dublin Bay and River Tolka Estuary SPA and mean peak numbers across the wider Dublin Bay I-WeBS recording area

SCI	Average number recorded during diurnal baseline surveys (across all 81 surveys)	Dublin Bay 10-year mean peak 2011/12–20/21	Acoustic Impacts			Visual Impacts		
			Average number experiencing disturbance from acoustic effects of single piling event	Average proportion of individuals recorded during diurnal baseline surveys impacted	Average proportion of Dublin Bay 10-year mean peak 2011/12–20/21 impacted	Average number experiencing disturbance from visual effects of single piling event	Average proportion of individuals recorded during diurnal baseline surveys impacted	Average proportion of Dublin Bay 10-year mean peak 2011/12–20/21 impacted
Black-headed gull	753.3	3131	2.03	0.27%	0.06%	81.07	10.76%	2.59%

530. For black-headed gull, the average number of individuals assessed as being present to experience potential disturbance in relation to acoustic impacts is low (2.03), whilst the average number of individuals assessed to experience potential disturbance in relation to visual impacts is 81.07.

531. Gulls, in general, are extremely adaptable, typically demonstrating a high level of tolerance and habituation to human activities (Calladine et al., 2006). This adaptability, along with a high degree of flexibility in their usage of habitats, provides these species with an ability to adapt to very high levels of visual and acoustic disturbance which may arise as a result of anthropogenic activities. Black-headed gull is assessed as having a low sensitivity to disturbance from people in intertidal habitats (Goodship & Furness, 2019).

532. It is considered, therefore, that of the numbers of black-headed gull available for experiencing disturbance, the numbers actually disturbed will be low due to their low sensitivity.

533. When considering the Conservation Objectives it is assessed that there will be no potential for construction phase disturbance and displacement impacts to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

534. No specific mitigation is proposed, or required, in respect of disturbance and displacement during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

535. As per project only assessment, above.

Project-only effect on site integrity conclusion for impact

536. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**. With regards to disturbance and displacement during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Construction phase impact 3 – Changes in prey availability

Array site and OECC

Project-only assessment

537. Changes in prey availability has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population trend (long term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

538. Black-headed gull is a generalist and opportunist forager, whose diet comprises a range of fish and invertebrate species, as well as carrion and refuse. Although fish species (including gadoids, sprats and sandeels) are anticipated to be impacted by underwater noise during the construction phase, these species are not considered to form a key part of the black-headed gull's diet.

539. Mortality or injury-inducing underwater noise impacts to gadoids, sprats and sandeels (primarily in relation to pile driving for WTG and OSS foundation installation, and also UXO) are therefore not considered to have potential to result in population level consequences to black-headed gull.

540. In relation to these Conservation Objective attributes, there will be no potential for changes in prey availability during the construction phase to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI.

541. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

542. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

543. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

544. Black-headed gull is a generalist and opportunist forager, whose diet comprises a range of fish and invertebrate species, as well as carrion and refuse. Although fish species (including gadoids, sprats and sandeels) are anticipated to be impacted by underwater noise during the construction phase, these species are not considered to form a key part of the black-headed gull's diet.

545. Construction phase activities within the OECC intertidal landfall area which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population trend (long-term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

546. These Conservation Objective attributes have the potential to be impacted through a reduction in prey availability due to:

a. Increased suspended sediment levels may temporarily alter the distribution of fish and mobile invertebrate species should they respond to avoid areas of altered water column condition.

b. Alteration of habitats which support prey species may reduce the capacity of those habitats to hold or produce prey species, thereby reducing the abundance of prey available to foraging seabirds within and around impacted areas.

547. The extent of intertidal areas (between MLWS and MHWS) within South Dublin Bay is approximately 21.94 km^2, within which approximately 0.16 km^2 (0.72%) are predicted to be disturbed during landfall cable installation (see **Chapter 4: Project Description**; **Section 4.8**). As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during construction activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

548. In relation to these Conservation Objective attributes, there will be no potential for changes in prey availability during the construction phase to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI.

549. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

550. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

551. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

552. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**. With regards to changes in prey availability during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and Maintenance Phase Impacts

Operation and maintenance impact 1 – Direct effects on habitat

Array site

Project-only assessment

553. With regards to the array site, relevant operation and maintenance phase direct effects on habitat relate to the occupation of sea surface areas by the footprint of operational infrastructure and therefore become unavailable for use by seabird SCIs to undertake non-foraging behaviours. As the array site does not overlap this SPA, all direct effects on habitat will occur entirely outside of the SPA, i.e., all direct effects assessed here relate to ex situ habitats which may support this SPA SCI.

554. As the operation and maintenance phase progresses through its planned duration of 25 years, the above sea level spatial extent of infrastructure will at no point exceed 0.005 km^2 within the array site (i.e., combined sea level area of all WTGs and OSSs). This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population trend (long-term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

555. In relation to these Conservation Objective attributes, operation and maintenance phase activities within the array site and OECC may reduce the marine areas in which individuals can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of the spatial footprint of operational infrastructure within the array site may affect the energetic costs of non-foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

556. Despite the above potential pathways to impact, these direct effects on habitat do not affect any area of the SPA (and hence do not affect the distribution of foraging, roosting or breeding habitat of this SCI within the SPA).

557. In the context of the extent of available habitat within foraging range of the SPA, and the negligible proportion that will be occupied by operational infrastructure, the scale of direct effects on habitat within the array site is considered to be negligible. Accordingly, the level of impact is not considered capable of altering the extent of available habitat in such a way as to impact the population size of this SPA SCI.

558. In relation to these Conservation Objective attributes, there will be no potential for direct effects on habitat during the operation and maintenance phase to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI.

559. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

560. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

561. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

562. Impacts considered to be direct effects on habitat may arise as a consequence of maintenance activities which temporarily remove or alter areas of intertidal habitat which are utilised by this SCI. Cable landfall duct maintenance activities and potential cable repair works during the operation and maintenance phase within South Dublin Bay have the potential to alter areas of intertidal habitat such that they become temporarily unavailable to black-headed gull connected with South Dublin Bay and River Tolka Estuary SPA, which may otherwise utilise those areas for non-foraging behaviours.

563. Direct effects on intertidal habitat have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population trend (long-term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

564. In relation to these Conservation Objective attributes, operation and maintenance of the CWP Project OECC intertidal landfall may result in temporary reductions in the spatial extent of the intertidal areas within South Dublin Bay in which individuals from South Dublin Bay and River Tolka Estuary SPA can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of operation and maintenance phase activities within the OECC intertidal landfall may directly affect demographic parameters (for example, use of alternative roosting areas may increase vulnerability to predation and reduce survival rates), or may affect the energetic costs of non-foraging behaviours through increased occupancy of sub-optimal area and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

565. Despite the above potential pathways to impact, as the spatial extent of any temporary direct effects on intertidal habitats from maintenance activities will be, at most extremely localised, should extraction and reinstatement of intertidal areas be required, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the population of the black-headed gull SCI of South Dublin Bay and River Tolka Estuary SPA. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of the black-headed gull SCI of South Dublin Bay and River Tolka Estuary SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to South Dublin Bay and River Tolka Estuary SPA.

566. These Conservation Objective attributes have the potential to be impacted through the presence of built infrastructure following the removal of previously available habitat.

567. The extent of intertidal areas (between MLWS and MHWS) within South Dublin Bay is approximately 21.94 km^2, within which approximately 0.16 km^2 (0.72%) are predicted to be disturbed during landfall cable installation (see **Chapter 4: Project Description**; **Section 4.8**). The scale of any maintenance to buried infrastructure carried out during the operation and maintenance phase will likely be considerably smaller than that during cable installation during the construction phase. As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during operation and maintenance activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

568. Following the backfilling of any excavations during the operation and maintenance phase, it is considered that the re-establishment of intertidal habitat available to birds for non-foraging activities would occur rapidly due to the dynamic nature of intertidal habitats within South Dublin Bay. Any effects on the physical habitat around active intertidal excavation loci would be brief, lasting less than several tidal cycles. Intertidal mudflats are considered resilient to isolated physical disturbances and can recover well (OSPAR, 2023).

569. In relation to these Conservation Objective attributes, there will be no potential for direct effects on habitat during the operation and maintenance phase to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI.

570. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

571. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

572. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

573. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**. With regards to direct effects on habitat during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance phase impact 2 – Changes in prey availability

Array site and OECC

Project-only assessment

574. Changes in prey availability has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population trend (long-term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

575. Black-headed gull is a generalist and opportunist forager, whose diet comprises a range of fish and invertebrate species, as well as carrion and refuse. Although fish species (including gadoids, sprats and sandeels) are anticipated to be impacted by underwater noise during the operation phase, these species are not considered to form a key part of the black-headed gull's diet.

576. In relation to these Conservation Objective attributes, maintenance activities during the operational phase of the CWP Project array site and OECC may impact black-headed gull prey species through underwater noise effects, increases to suspended sediment concentrations, removal or alteration of important benthic habitats for those prey species, or electromagnetic field effects affecting prey species distributions around electrical infrastructure. Should these impacts to prey species reduce the availability of those prey species to foraging black-headed gulls, this may result in effects to the demographic parameters, and resultant population dynamics, of this SCI through processes such as increased energetic consequences of foraging reducing individual condition and survival or productivity rates, or reduced provisioning rates to offspring reducing productivity rates. These potential consequences may compromise the ability of the SCI to maintain its population, with prey availability changes potentially resulting in there being insufficient habitat to support the SCI's population on a long-term basis.

577. As operational phase activities within the array site and OECC will not include piling works or any other very high energy underwater noise inducing activities, and operational noise impact magnitudes to all potential prey species are assessed to be very low, there is not considered to be a pathway for

operation and maintenance phase underwater noise impacts to have the potential to cause perceptible changes to prey availability in such a way that could impact this SCI.

578. Similarly, as operational phase activities within the array site do not routinely require disturbance of the seabed (in the form of trenching or dredging activities) except within localised areas in which this is necessary to facilitate repairs, increased SSC levels, are considered to occur only potentially infrequently and locally during the operational phase and there is no perceptible pathway for this impact to have the potential to cause changes to prey availability during the operational phase in such a way that could impact this SCI.

579. Prey species, upon which the SCI depredates, may experience the loss of up to 0.49 km^2 of previously available benthic habitat within the array site as a result of occupancy of the seabed by infrastructure during the operation and maintenance phase of the CWP Project. The spatial extent of such prey species habitat loss is, however, considered to be of negligible size in relation to this SCI's breeding and non-breeding season range extents.

580. During the operation and maintenance phase, one additional potential impact to seabird receptor prey species which does not occur during the construction phase is considered, namely EMF effects, associated with electricity passing along infrastructure cables. Any effects on fish are anticipated to occur within the immediate vicinity of the cable and effect levels are likely to be low in relation to background levels associated with the Earth's magnetic field. The magnitude of such impacts to potentially sensitive fish species are assessed as being very low. Consequently, there is not considered to be a pathway for operation and maintenance phase EMF impacts to have the potential to cause impacts to prey availability in such a way that could impact this SCI.

581. In the context of the extent of available habitat within foraging range of the SPA, the negligible proportion of that habitat in which potential impacts to prey species may occur, and that potential impacts to prey species may be of limited (if any) demographic consequence to their seabird predators, the scale of changes in prey availability impacts associated with operation and maintenance phase activities within the array site and OECC is considered to be negligible.

582. In relation to these Conservation Objective attributes, there will be no potential for changes in prey availability during the operation and maintenance phase to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI.

583. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

584. No specific mitigation is proposed, or required, in respect of disturbance and displacement during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

585. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

586. Black-headed gull is a generalist and opportunist forager, whose diet comprises a range of fish and invertebrate species, as well as carrion and refuse.

587. Changes in prey availability has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population trend (long-term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

588. These Conservation Objective attributes have the potential to be impacted through a reduction in prey availability due to:

a. Increased suspended sediment levels may temporarily alter the distribution of fish and mobile invertebrate species should they respond to avoid areas of altered water column condition.

b. Alteration of habitats which support prey species may reduce the capacity of those habitats to hold or produce prey species, thereby reducing the abundance of prey available to foraging seabirds within and around impacted areas.

589. The extent of intertidal areas (between MLWS and MHWS) within South Dublin Bay is approximately 21.94 km^2, within which approximately 0.16 km^2 (0.72%) are predicted to be disturbed during landfall cable installation (see **Chapter 4: Project Description**; **Section 4.8**). The scale of any maintenance to buried infrastructure carried out during the operation and maintenance phase will likely be considerably smaller than that during cable installation during the construction phase. As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during operation and maintenance activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

590. In relation to these Conservation Objective attributes, there will be no potential for changes in prey availability during the operation and maintenance phase to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI.

591. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

592. No specific mitigation is proposed, or required, in respect of disturbance and displacement during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

593. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

594. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**. With regards to changes in prey availability during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance impact 3 – Collision

Array site

Project-only assessment

595. During the operation and maintenance phase of the CWP Project the presence of operational WTGs within the array site may result in the mortality of this SPA SCI through the collision of individuals with turbine blades. Collision mortality has the potential to impact on the following Conservation Objective attribute and target for this SPA SCI:

- Population trend (long-term population trend stable or increasing).

596. In relation to this Conservation Objective attribute, mortality resultant from collision with operational WTGs within the array site may directly affect the overall survival rate of this SPA SCI. Furthermore, collision mortality may also adversely affect the overall productivity rate of this SPA SCI through reductions to offspring provisioning rates and other parental care metrics. These potential consequences may compromise the ability of the SCI to maintain its population on a long-term basis.

597. Flight activity by this SCI recorded within the array site during baseline surveys was extremely low throughout the baseline survey period (see **Appendix 10.5: Baseline Characterisation Report** of the EIAR). Consequently, CRM has not been undertaken for this species on the basis that flight densities within the array site are extremely low and that resultant mortality rates to this SCI would be negligible.

598. As additional mortality to this SPA SCI resulting from collision with operational WTGs is estimated to represent only a negligible potential increase to SPA baseline mortality rates, this impact is considered not to impede the overall objective of maintaining / restoring the favourable conservation condition of the SPA SCI. Specifically, collision mortality will not affect the population dynamics of the SCI in such a way as to compromise its ability to maintain itself on a long-term basis as a viable component of its natural habitats. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

599. No specific mitigation is proposed, or required, in respect of collision during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

600. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

601. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-1**. With regards to collision impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

2.2.6 Receptor 14: Wetland and Waterbirds

Construction Phase Impacts

Construction phase impact 1 – Direct effects on habitat

Project-only assessment

602. Direct effects on habitat have the potential to impact on the following Conservation Objective attribute and target for the Wetland and Waterbirds SCI for this SPA:

- Habitat area (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).

603. Impacts considered to be direct effects on habitat may arise as a consequence of activities which temporarily disturb intertidal habitat designated under the wetland component of the site. Direct effects to intertidal areas are considered only to relate to the physical footprint of the proposed intertidal infrastructure and works (i.e. the intertidal cable route during construction and any infrastructure at the proposed landfall location).

604. In relation to the Conservation Objective attribute, construction in the OECC landfall area may temporarily reduce the habitat area.

605. The spatial extent of intertidal habitat within South Dublin Bay and River Tolka Estuary SPA is 21.94 km^2. Approximately 0.16 km^2 of intertidal habitat within South Dublin Bay is estimated to be subject to temporary direct effects as a result of intertidal cable landfall activities (0.04 km^2 from open cut landfall cable duct installation, 0.006 km^2 from cofferdam installation, and 0.11 km^2 from cable laying activities in the transition zone). This equates to approximately 0.72% of the total intertidal habitat area within the SPA being subject to temporary direct effects on habitat during the construction phase of the proposed intertidal landfall works.

606. Following the backfilling of any excavated sections of trenching and removal of any supporting vehicles and / or infrastructure, it is considered that the re-establishment of intertidal habitat available to birds for non-foraging activities would occur rapidly due to the dynamic nature of intertidal habitats within South Dublin Bay. Any effects on the physical habitat around active intertidal construction loci would be brief, lasting less than several tidal cycles. Intertidal mudflats are considered resilient to isolated physical disturbances and can recover well (OSPAR, 2023).

607. Despite the above potential pathways to impact, in the context of the negligible proportion of intertidal habitat within the SPA which will be affected during construction and the short-term temporary nature of the effects to those habitats, the scale of direct effects on habitat within the OECC intertidal landfall area is considered to be negligible. Accordingly, the level of impact is not considered capable of resulting in a reduction in the habitat area in the long term.

608. In relation to the Conservation Objective attribute for the Wetland and Waterbirds SCI, there will be no potential for direct effects during the construction phase to adversely affect the habitat area in the long term.

609. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

610. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of this SCI in the SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the South Dublin Bay and River Tolka Estuary SPA.

Proposed mitigation

611. No specific mitigation is proposed, or required, in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

612. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

613. The Conservation Objective and its attribute and target for the Wetland and Waterbirds SCI of this SPA is presented in **Table 2-1**. With regards to direct effects on habitat impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and Maintenance Impacts

Operation and maintenance phase impact 1 – Direct effects on habitat

Project-only assessment

614. Impacts considered to be direct effects on habitat may arise as a consequence of maintenance activities which temporarily remove or alter areas of intertidal habitat which would otherwise support ornithological SCIs of South Dublin Bay and River Tolka Estuary SPA. Cable landfall duct maintenance activities and potential cable repair works during the operation and maintenance phase within South Dublin Bay have the potential to alter areas of intertidal habitat such that they become temporarily unavailable to ornithological SCIs of South Dublin Bay and River Tolka Estuary SPA, which may otherwise utilise those areas for non-foraging behaviours

615. Direct effects on habitat have the potential to impact on the following Conservation Objective attribute and target for the Wetland and Waterbirds SCI for this SPA:

- Habitat area (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).

616. In relation to these Conservation Objective attributes, operation and maintenance of the CWP Project OECC intertidal landfall may result in temporary reductions in the spatial extent of the intertidal areas within South Dublin Bay in which individuals from South Dublin Bay and River Tolka Estuary SPA can undertake non-foraging behaviours.

617. Despite the above potential pathway to impact, as the spatial extent of any temporary direct effects on intertidal habitats from maintenance activities will be, at most extremely localised, should extraction and reinstatement of intertidal areas be required, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the intertidal habitat area of South Dublin Bay and River Tolka Estuary SPA. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of the wetland habitat in the SPA as a resource for the regularly occurring migratory waterbirds that utilise it. In light of this, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to South Dublin Bay and River Tolka Estuary SPA.

Proposed mitigation

618. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

619. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

620. The Conservation Objective and its attribute and target for the Wetland and Waterbirds SCI of this SPA is presented in **Table 2-1**. With regards to direct effects on habitat impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

2.2.7 SPA-specific Assessment of Invasive Non-Native Species

Project-only assessment

621. Given the overlap between South Dublin Bay and River Tolka Estuary SPA and areas in which works will be undertaken during both the CWP Project construction and operation and maintenance phases, activities within the OECC intertidal landfall area and around onshore infrastructure have the potential to result in the introduction or spread of INNS which may result in a reduction in the quality of in situ habitats used by the SCIs of South Dublin Bay and River Tolka Estuary SPA.

622. Consideration of the potential impacts to ornithology resulting from the introduction and spread of INNS are herein assessed for all SCIs of South Dublin Bay and River Tolka Estuary SPA collectively. Although it is considered that potential AESI arising from this impact would manifest similarly regardless of the SCIs affected, it is noted that different SCIs of this SPA have different sets of Conservation Objective attributes dependant on how different species groupings utilise this site.

623. For tern SCIs (common, roseate and Arctic tern), which utilise South Dublin Bay as a site in which to form post-breeding aggregations, these in situ effects have the potential to impact on the following Conservation Objective attributes and targets:

- Passage population – No significant decline;
- Distribution: roosting areas – No significant decline; and
- Prey biomass available – No significant decline.

624. Furthermore, for common tern, which is also designated as a SCI of this SPA in relation to the breeding population at the site, in situ INNS effects have the potential to impact on the following additional Conservation Objective attributes and targets:

- Breeding population abundance – No significant decline;
- Productivity rate – No significant decline; and
- Distribution: breeding colonies – No significant decline.

625. For other waterbird SCIs (waders, wildfowl and non-breeding gulls), in situ INNS effects have the potential to impact on the following Conservation Objective attributes and targets:

- Population trend – Long term population trend stable or increasing; and
- Distribution – No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation.

626. In relation to these Conservation Objective attributes, introduction or spread of INNS due to both construction and operation and maintenance phase activities associated with the CWP Project may impede the achievement of SCI Conservation Objective attribute targets broadly through INNS altering the utility of receiving habitats and ecosystems for SCIs.

627. INNS effects which alter the ecosystems and habitats within the SPA may affect the abundance or distribution of prey species within the SPA and/or the distribution of habitats in which SCIs can undertake key behaviours such as foraging, roosting or (for common tern only) breeding. These impacts, in turn, may adversely affect the populations of SCIs which utilise the SPA, and thereby impede Conservation Objective attribute targets relating to no significant declines in passage populations (and, for common tern only, breeding population).

628. In the context of the extent of habitat within the SPA, and the proportion of areas which may experience reduced utility to the SCIs of South Dublin Bay and River Tolka Estuary SPA, should invasive non-native species be introduced in relation to construction and/or operation and maintenance phase activities associated with the CWP Project, the scale of potential impacts from the introduction or spread of INNS is unknown, and as such, AESI cannot be ruled out. Such impacts are considered potentially capable of altering the population dynamics, or extents of available habitats in such a way as to result in a significant decline in the population abundance, productivity, passage populations and distributions of, and prey biomass available to, the SCIs of South Dublin Bay and River Tolka Estuary SPA. Impacts arising from the CWP Project may therefore have the potential impede the overall objective of maintaining / restoring the favourable conservation condition of the SCIs of South Dublin Bay and River Tolka Estuary SPA. In light of these factors, AESI to the South Dublin Bay and River Tolka Estuary SPA cannot be ruled out as a result of construction and/or operation and maintenance phase activities within the OECC intertidal landfall area of the CWP Project.

Proposed mitigation

629. The implementation of mitigation measures to align with EU policy (specifically EU Regulation 1143 [regarding the prevention and management of the introduction and spread of invasive alien species]; and The EU Biodiversity Strategy for 2030 [which contains a commitment to manage established invasive alien species and decrease the number of Red List species they threaten by 50% by 2030])

in the form of biosecurity protocols outlined within the Construction Environmental Management Plan (CEMP) and VMP, shall eliminate or reduce INNS introduction risks within areas in which construction and/or operation and maintenance activities are undertaken. This will have the effect of eliminating or reducing potential introduction or spread of INNS impacts within supporting habitats of the SCIs of South Dublin Bay and River Tolka Estuary SPA.

Residual effect

630. With the implementation of mitigation as outlined above, given the reduced or eliminated risk of introduction and spread of INNS during construction and/or operation and maintenance phase activities within South Dublin and River Tolka Estuary SPA, there is no potential for AESI to result from this impact to the listed SCIs of the SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-1**.

Project-only effect on site integrity conclusion for impact

631. The Conservation Objective and its attributes and targets for the SCI of South Dublin Bay and River Tolka Estuary SPA are presented in **Table 2-1**. With regard to introduction or spread of INNS impacts during the construction and/or operation and maintenance phase(s) of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for SCIs of the South Dublin Bay and River Tolka Estuary SPA.**

2.3 North Bull Island SPA (IE004006)

632. This SPA is designated in relation to the following SCIs which have been screened in for consideration within the NIS: black-headed gull, light-bellied brent goose, shelduck, teal, pintail, shoveler, oystercatcher, golden plover, grey plover, knot, sanderling, dunlin, black-tailed godwit, bar-tailed godwit, curlew, redshank and turnstone.

633. The minimum separation distance between SPA and the array site is 30.63 km.

634. The minimum separation distance between SPA and the OECC is 3.0 km.

635. The minimum separation distance between SPA and the OECC intertidal landfall is 4.83 km.

636. As such there are no in situ interactions and all effects assessed, including direct effects, relate to ex situ interactions with the wider natural range of the SCIs.

Table 2-11: Assessment of adverse effects on site integrity (project alone) - North Bull Island SPA

Objective:	Attributes and targets	Predicted effect	Link to assessment	Mitigation	Residual effect	Conclusion
Black-headed gull [A179]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.3.2**	None	No change	No AESI
		Disturbance and displacement [1,2]		**Section 2.3.2**	**Section 2.3.2**	No AESI
		Changes in prey availability [1, 2]		None	No change	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See high-level assessment in **Section 2.1**			No AESI
Light-bellied brent goose [A046]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.3.1**	None	No change	No AESI
		Disturbance and displacement (including barrier effects) [1,2]		**Section 2.3.1**	**Section 2.3.1**	No AESI
		Changes in prey availability [1,2]		None	No change	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See high-level assessment in **Section 2.1**			No AESI
Shelduck [A048]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.3.1**	None	No change	No AESI
		Disturbance and displacement (including barrier effects) [1,2]		**Section 2.3.1**	**Section 2.3.1**	No AESI
		Changes in prey availability [1,2]		None	No change	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See high-level assessment in **Section 2.1**			No AESI
Teal [A052]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.3.1**	None	No change	No AESI
		Disturbance and displacement (including barrier effects) [1,2]		**Section 2.3.1**	**Section 2.3.1**	No AESI
		Changes in prey availability [1,2]		None	No change	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See high-level assessment in **Section 2.1**			No AESI

Objective:	Attributes and targets	Predicted effect	Link to assessment	Mitigation	Residual effect	Conclusion
Pintail [A054]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.3.1**	None	No change	No AESI
		Disturbance and displacement (including barrier effects) [1,2]		**Section 2.3.1**	**Section 2.3.1**	No AESI
		Changes in prey availability [1,2]		None	No change	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See high-level assessment in **Section 2.1**			No AESI
Shoveler [A857]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.3.1**	None	No change	No AESI
		Disturbance and displacement (including barrier effects) [1,2]		**Section 2.3.1**	**Section 2.3.1**	No AESI
		Changes in prey availability [1,2]		None	No change	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See high-level assessment in **Section 2.1**			No AESI
Oystercatcher [A130]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.3.1**	None	No change	No AESI
		Disturbance and displacement (including barrier effects) [1,2]		**Section 2.3.1**	**Section 2.3.1**	No AESI
		Changes in prey availability [1,2]		None	No change	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See high-level assessment in **Section 2.1**			No AESI
Golden plover [A140]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.3.1**	None	No change	No AESI
		Disturbance and displacement (including barrier effects) [1,2]		**Section 2.3.1**	**Section 2.3.1**	No AESI
		Changes in prey availability [1,2]		None	No change	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See high-level assessment in **Section 2.1**			No AESI

Objective:	Attributes and targets	Predicted effect	Link to assessment	Mitigation	Residual effect	Conclusion
Grey plover [A141]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.3.1**	None	No change	No AESI
		Disturbance and displacement (including barrier effects) [1,2]		**Section 2.3.1**	**Section 2.3.1**	No AESI
		Changes in prey availability [1,2]		None	No change	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See high-level assessment in **Section 2.1**			No AESI
Knot [A143]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.3.1**	None	No change	No AESI
		Disturbance and displacement (including barrier effects) [1,2]		**Section 2.3.1**	**Section 2.3.1**	No AESI
		Changes in prey availability [1,2]		None	No change	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See high-level assessment in **Section 2.1**			No AESI
Sanderling [A144]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.3.1**	None	No change	No AESI
		Disturbance and displacement (including barrier effects) [1,2]		**Section 2.3.1**	**Section 2.3.1**	No AESI
		Changes in prey availability [1,2]		None	No change	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See high-level assessment in **Section 2.1**			No AESI
Dunlin [A149]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.3.1**	None	No change	No AESI
		Disturbance and displacement (including barrier effects) [1,2]		**Section 2.3.1**	**Section 2.3.1**	No AESI
		Changes in prey availability [1,2]		None	No change	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See high-level assessment in **Section 2.1**			No AESI

Objective:	Attributes and targets	Predicted effect	Link to assessment	Mitigation	Residual effect	Conclusion
Black-tailed godwit [A156]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.3.1**	None	No change	No AESI
		Disturbance and displacement (including barrier effects) [1,2]		**Section 2.3.1**	**Section 2.3.1**	No AESI
		Changes in prey availability [1,2]		None	No change	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See high-level assessment in **Section 2.1**			No AESI
Bar-tailed godwit [A157]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.3.1**	None	No change	No AESI
		Disturbance and displacement (including barrier effects) [1,2]		**Section 2.3.1**	**Section 2.3.1**	No AESI
		Changes in prey availability [1,2]		None	No change	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See high-level assessment in **Section 2.1**			No AESI
Curlew [A160]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.3.1**	None	No change	No AESI
		Disturbance and displacement (including barrier effects) [1,2]		**Section 2.3.1**	**Section 2.3.1**	No AESI
		Changes in prey availability [1,2]		None	No change	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See high-level assessment in **Section 2.1**			No AESI
Redshank [A162]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.3.1**	None	No change	No AESI
		Disturbance and displacement (including barrier effects) [1,2]		**Section 2.3.1**	**Section 2.3.1**	No AESI
		Changes in prey availability [1,2]		None	No change	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See high-level assessment in **Section 2.1**			No AESI

Objective:	Attributes and targets	Predicted effect	Link to assessment	Mitigation	Residual effect	Conclusion
Turnstone [A169]						
To maintain the favourable conservation condition of the SCI in the SPA	1. Population trend – Long-term population trend stable or increasing 2. Distribution - No significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation	Direct effects on habitat [1,2]	**Section 2.3.1**	None	No change	No AESI
		Disturbance and displacement (including barrier effects) [1,2]		**Section 2.3.1**	**Section 2.3.1**	No AESI
		Changes in prey availability [1,2]		None	No change	No AESI
		Collision [1]		None	No change	No AESI
		Introduction or spread of invasive species [1,2]	See high-level assessment in **Section 2.1**			No AESI

2.3.1 Receptor 1 - 16: Light-bellied brent goose to turnstone

637. Receptors 1–16 (**Table 2-11**) are grouped here as they are all migrant species that utilise the intertidal habitats; they also all have the same Conservation Objectives, attributes and targets.

Construction Phase Impacts

Construction phase impact 1 – Direct effects on habitat

OECC Intertidal landfall

Project-only assessment

638. Direct effects on habitat have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population trend (long term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

639. Given the proximity of North Bull Island SPA to South Dublin Bay, the wader and waterfowl SCIs which utilise habitats within North Bull Island SPA are also likely over the course of the non-breeding periods in which they typically occupy the Dublin Bay area in greatest numbers, to use intertidal areas within South Dublin Bay and, as such may experience direct effects on habitat from construction phase activities within this area.

640. Impacts considered to be direct effects on habitat may arise as a consequence of activities which temporarily disturb areas of intertidal habitat which are utilised by ornithological SCIs. There is no direct loss or removal of intertidal habitat proposed by the CWP project. Direct effects to intertidal areas which may be utilised by birds for foraging and non-foraging behaviours (such as roosting, loafing and maintenance) are considered only to relate to the physical footprint of the proposed intertidal infrastructure and works (i.e., the intertidal cable route during construction and any infrastructure at the proposed landfall location).

641. In relation to the Conservation Objective attributes, construction in the OECC landfall area may temporarily reduce the areas in which individuals can undertake foraging or non-foraging behaviours. These impacts may affect energetic costs, which may in turn affect condition of individuals and survival rates.

642. As assessed for the wader and waterfowl SCIs of South Dublin Bay and River Tolka Estuary SPA (**Section 2.2.4**), approximately 0.72% of the total intertidal habitat area within the SPA is subject to temporary direct effects on habitat during the construction phase of the proposed intertidal landfall works.

643. Following the backfilling of any excavated sections of trenching and removal of any supporting vehicles and / or infrastructure, it is considered that the re-establishment of intertidal habitat available to birds for non-foraging activities would occur rapidly due to the dynamic nature of intertidal habitats within South Dublin Bay. Any effects on the physical habitat around active intertidal construction loci would be brief, lasting less than several tidal cycles. Intertidal mudflats are considered resilient to isolated physical disturbances and can recover well (OSPAR, 2023).

644. Despite the above potential pathways to impact, in the context of the negligible proportion of intertidal habitat within the SPA (functionally connected South Dublin Bay and River Tolka Estuary SPA) which will be affected during construction and the short-term temporary nature of the effects to those habitats, the scale of direct effects on habitat within the OECC intertidal landfall area is considered to be negligible. In particular, the reduction in intertidal areas in which the SCIs frequent is not expected to give rise to energetic costs in such a way as to impact the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of impacting the population abundance sizes of these SCIs.

645. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of these SPA SCIs. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the North Bull Island SPA.

646. In relation to these Conservation Objective attributes for these SCIs (**Table 2-11**), there will be no potential for direct effects during the construction phase to adversely affect the population or distributions of these SPA SCIs in such a way as to result in AESI.

647. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to these SPA SCIs.

Proposed mitigation

648. No specific mitigation is proposed, or required, in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

649. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

650. The Conservation Objective and its attributes and targets for these SPA SCIs are presented in **Table 2-11**. With regards to direct effects on habitat impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for these SCIs and, in turn, that there is **no project-only AESI for these SPA SCIs.**

Construction phase impact 2 – Disturbance and displacement

Array site (barrier effects only)

Project-only assessment

651. Disturbance and displacement have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population trend (long term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

652. Given the proximity of North Bull Island SPA to South Dublin Bay, the wader and waterfowl SCIs which utilise habitats within North Bull Island SPA are also likely over the course of the non-breeding periods in which they typically occupy the Dublin Bay area in greatest numbers, to use intertidal areas within South Dublin Bay and, as such may experience direct effects on habitat from construction phase activities within this area.

653. Disturbance and displacement impacts to these migrant SCIs arising from the array site during construction are limited to barrier effects, i.e., the possibility they need to fly around the turbines during their annual migrations.

654. For the purpose of this assessment disturbance and displacement impacts through barrier effects to migratory species are conservatively treated as being the same as during the operational phase (albeit spanning a much shorter duration than those during the operational phase; 16 months, from initial turbine erection to operational, compared to a 25-year operational lifespan – **Chapter 4: Project Description**).

655. For migratory species, one-off energetic costs associated with relatively small deviations (such as travelling around the array site, rather than straight through) during typically large migratory movements are considered to be inconsequential in relation to energy reserves recruited for migration (Masden et al., 2009).

656. Therefore, the potential magnitude of impact on birds that only migrate through the array site (including waders and estuarine waterbirds) is considered negligible.

657. Consequently, there is assessed to be no potential for AESI to result from disturbance and displacement in the form of barrier effects during the construction phase at the array site in relation to the Conservation Objectives and attributes and targets for these SCIs as stated in **Table 2-11**.

Proposed mitigation

658. No specific mitigation is proposed, or required, in respect of disturbance and displacement during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

659. As per project-only assessment, above.

OECC Intertidal landfall

Project-only assessment

660. Given the proximity of North Bull Island SPA to South Dublin Bay, wader and waterfowl SCIs which utilise habitats within North Bull Island SPA, area also likely over the course of the non-breeding periods in which they typically occupy the Dublin Bay area in greatest numbers, to use intertidal areas within South Dublin Bay and, as such, may experience disturbance and displacement impacts from construction phase activities within this area.

661. Disturbance and displacement impacts to SCIs within intertidal areas during construction periods area assessed in relation to the potential for disturbance to result from:

- Acoustic stimuli (from piling activities within intertidal habitats and onshore up to and including installation of the TJBs – with piling activities occurring on up to a total of 26 days).

- Visual stimuli (from sequential cable laying activities, associated preparatory works and the installation of ancillary structures within intertidal habitats and onshore up to and including installation of the TJBs – including cable duct installation over a period of up to 18 weeks, coffer dam construction over a period of up to 6 weeks, tensioner platform installation over a total of 9 days, cable pull through intertidal areas over a total of up to 9 weeks and around a mid-support pontoon (floating parking platform for plant / machinery) which will be present in the intertidal zone throughout the construction period).

662. Acoustic and visual stimuli associated with any given construction activity during diurnal periods (i.e. outside periods in which receptors are nocturnally roosting) at any given time of year are predicted to, on average, impact numbers of each SCI species as shown in **Table 2-11**. These numbers of impacted individuals are compared to the average number of each species observed within the North Bull Island SPA during all diurnal baseline surveys (as outlined in **Technical Appendix 10.5: Baseline Characterisation Report** of the EIAR) and the 10-year mean peak of each species within the wider Dublin Bay I-WeBS recording area (which also includes South Dublin Bay and River Tolka Estuary SPA, taken from the Site Summary Table for 0U404 Dublin Bay: available at Site Summary Tables_S27_(caspio.com)) in order to ascertain whether construction phase disturbance and displacement impacts may adversely affect the population size and / or distribution of each SCI and thereby result in potential for AESI.

663. As with the assessment of acoustic and visual anthropogenic disturbance which was carried out for South Dublin Bay and River Tolka Estuary SPA, the numbers and proportions of SCIs of the functionally connected North Bull Island SPA which are predicted to be impacted by activities associated with the CWP Project within the OECC intertidal landfall have been assessed based on information that is known about each species' sensitivity to acoustic and/or visual anthropogenic disturbance and areas which are predicted to be impacted by visual and/or acoustic disturbance during the construction phase of the CWP Project.

664. Given the proximity (North Bull Island SPA abuts South Dublin Bay and River Tolka Estuary SPA at its southern extent) and functional connectivity (it is conservatively assumed for assessment purposes that up to 100% of SCIs within North Bull Island SPA may utilise habitats within South Dublin Bay and River Tolka Estuary SPA), it is considered that SCIs of North Bull Island SPA may experience ex situ disturbance and displacement impacts as a result of anthropogenic visual and acoustic disturbance within South Dublin Bay.

665. Species-specific reactivity to both acoustic and visual stimuli are taken from Cutts et al. (2013). These sensitivities are listed in **Section 2.2.4** for the following species:

- Light-bellied brent goose;
- Oystercatcher;
- Grey plover;
- Knot;
- Sanderling;
- Dunlin;
- Bar-tailed godwit; and
- Redshank.

666. Sensitivities to visual and acoustic disturbance (Cutts et al., 2013; unless otherwise stated) for the remaining waterbird SCIs of North Bull Island SPA are listed below:

- Shelduck are highly sensitive to both acoustic and visual disturbance;
- Teal are moderately sensitive to both acoustic and visual disturbance (Bregnballe et al., 2017);
- Pintail are moderately sensitive to both acoustic and visual disturbance (Goodship & Furness, 2022);
- Shoveler are moderately sensitive to both acoustic and visual disturbance (Goodship & Furness, 2022);

- Golden plover are moderately sensitive to both acoustic and visual disturbance;
- Black-tailed godwit are moderately sensitive to both acoustic and visual disturbance;
- Curlew are moderately sensitive to both acoustic and visual disturbance; and
- Turnstone are of low sensitivity to both acoustic and visual disturbance.

667. Where species occur within range of acoustic and visual disturbances at levels to which they are sensitive, they are considered to be available for disturbance. Acoustic and visual stimulus thresholds (i.e., the noise levels generated by and distances from disturbance-inducing anthropogenic activities to which ornithological receptors may react to their species-specific sensitivity levels) are provided in **Table 2-6**, **Section 2.2.4**.

668. As per the assessment which was carried out for South Dublin Bay and River Tolka Estuary SPA, and on the basis of functional connectivity with North Bull Island SPA (expressed as the conservative assumption that up to 100% of North Bull Island SPA SCIs may utilise habitats within the former), information available in relation to both noise and visual impacts generated by activities associated with the CWP Project within the OECC intertidal landfall area and overlap between areas predicted to be subject to such impacts, as they are described in **Table 2-6**, have been assessed against occurrences of North Bull Island SCIs as recorded within the OECC intertidal landfall study area (on the basis of ex situ utilisation) during the baseline survey period (and against the I-WeBS 10-year mean peak count from 2011 / 12 to 2020 / 21), to give numbers and proportions of each SCI predicted to be impacted by acoustic and visual anthropogenic disturbance as they occur at levels to which these individual species are sensitive (**Table 2-12**).

669. In all cases, acoustic and visual disturbance predictions presented in **Table 2-12** are based upon the most potentially impactful cable installation scenario through the intertidal area for each receptor, either for cables being installed around a central alignment within the OECC intertidal landfall area (the preferred alignment scenario), or for cables installed with maximum separation distances within the OECC intertidal landfall area (the AAM scenario).

Table 2-12: Average numbers of each wintering waterfowl and wader SCI experiencing potential disturbance from acoustic and visual stimuli compared to average numbers present within the South Dublin Bay section of the functionally connected South Dublin Bay and River Tolka Estuary SPA and mean peak numbers across the wider Dublin Bay I-WeBS recording area

SCI	Average number recorded during diurnal baseline surveys (across all 81 surveys)	Dublin Bay 10-year mean peak 2011/12–20/21	Acoustic Impacts			Visual Impacts		
			Average number experiencing disturbance from acoustic effects of single piling event	Average proportion of individuals recorded during diurnal baseline surveys impacted	Average proportion of Dublin Bay 10-year mean peak 2011/12–20/21 impacted	Average number experiencing disturbance from visual effects of all activities from intertidal cable landfall	Average proportion of individuals recorded during diurnal baseline surveys impacted	Average proportion of Dublin Bay 10-year mean peak 2011/12–20/21 impacted
Light-bellied brent goose	77.98	3747	19.93	25.56%	0.53%	23.18	29.73%	0.62%
Shelduck	5.49	3115	1.85	33.61%	0.10%	2.05	37.26%	0.12%
Teal	3.41	168	0.00	0.09%	0.00%	0.04	1.09%	0.00%
Pintail	0.2	342	0.00	0.00%	0.00%	0.00	0.00%	0.00%
Shoveler	0.09	6277	0.00	0.00%	0.00%	0.00	0.00%	0.00%
Oystercatcher	861.19	549	50.88	5.91%	1.63%	250.42	29.08%	8.04%
Golden plover	24.14	7603	0.44	1.83%	0.04%	2.45	10.15%	0.22%
Grey plover	3.07	2119	0.22	7.20%	0.06%	1.10	35.89%	0.32%
Knot	775.28	2166	136.83	17.65%	2.18%	77.16	9.95%	1.23%
Sanderling	53.06	3747	0.04	0.08%	0.01%	1.77	3.34%	0.32%
Dunlin	596.75	3115	1.74	0.29%	0.02%	160.17	26.84%	2.11%
Black-tailed godwit	110.81	168	1.38	1.24%	0.07%	8.44	7.62%	0.40%
Bar-tailed godwit	177.62	342	4.26	2.40%	0.20%	24.69	13.90%	1.17%
Curlew	47.73	6277	2.12	4.45%	0.24%	11.20	23.47%	1.26%
Redshank	166.7	549	54.48	32.68%	2.52%	26.74	16.04%	1.23%
Turnstone	66.37	7603	0.03	0.05%	0.01%	0.74	1.12%	0.24%

670. For pintail, shoveler and turnstone, the average number of individuals assessed to experience potential disturbance in relation to both acoustic and visual impacts during diurnal periods is very low (less than five individuals in all cases, which is <1% of the average number of individuals recorded during baseline surveys). As such there is no potential for construction phase disturbance and displacement impacts to adversely affect the population or distributions of these SCIs of the North Bull Island SPA in such a way as to result in AESI.

671. For light-bellied brent goose, shelduck, teal, oystercatcher, golden plover, grey plover, knot, dunlin, bar-tailed godwit, black-tailed godwit, curlew and redshank, the average number of individuals assessed to experience potential disturbance during diurnal periods in relation to both or either acoustic or visual impacts is between 1 and 29.82% depending on species. As such, and in the capacity of being assessed on an ex situ basis, there is considered to be the potential for construction phase disturbance and displacement impacts to adversely affect the population and / or distributions of these SCIs of the North Bull Island SPA in such a way as to result in AESI.

672. Unlike during diurnal periods, for which information relating to the ecological sensitivity of waders and waterfowl to visual and acoustic stimuli are available, disturbance responses of nocturnal roosting waders and waterfowl to such stimuli are unknown. As such, it is not possible to overlap disturbance effect ranges with receptor distributions to inform the assessment of potential disturbance and displacement impact magnitudes to roosting receptors for intertidal cable installation scenarios. It is therefore conservatively assumed that, should construction phase activities within intertidal areas of the functionally connected South Dublin and River Tolka Estuary SPA be conducted during nocturnal periods, whilst there is uncertainty on the magnitude of the impact, there is potential for AESI via ex situ disturbance and displacement impacts to light-bellied brent goose, oystercatcher, knot, dunlin, bar-tailed godwit and redshank SCIs and, furthermore, the potential for AESI via disturbance and displacement impacts to ringed plover, grey plover and sanderling may not be excluded.

Proposed mitigation

673. As intertidal habitats within South Dublin Bay are primarily used by these SCIs on an ex situ basis during their non-breeding periods as staging sites (stop-over locations within migratory flyways) or overwintering sites, mitigation in the form of a seasonal restriction to construction activities within (and surrounding) intertidal areas will be effective to ensure no AESI to these SCIs of the SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-11**.

674. Full details of this seasonal restriction additional mitigation are as follows:

- No construction phase cable route installation or associated activities, including preparatory works, will be undertaken within the South Dublin Bay area during the period of September to March, inclusive.
- This area corresponds with the extent of intertidal habitat (areas between MLWS and MHWS) within the South Dublin Bay part of the functionally connected South Dublin Bay and River Tolka Estuary SPA.

675. Where construction works within intertidal areas are constrained to occurring within the April to August period (as outlined above), potential project only disturbance and displacement impacts are assessed as follows:

676. Acoustic and visual stimuli associated with any given piling event during diurnal periods (i.e. outside periods in which receptors are nocturnally roosting) during the April to August, inclusive, period are predicted to, on average, impact numbers of each SCI species as shown in **Table 2-11**. These numbers of impacted individuals are compared to the average number of each species observed within the South Dublin Bay part of the South Dublin Bay and River Tolka Estuary SPA during diurnal baseline surveys throughout the year and the 10-year mean peak of each species within the wider Dublin Bay

I-WeBs recording area (which also includes North Bull Island SPA, taken from the Site Summary Table for 0U404 Dublin Bay: available at Site Summary Tables_S27 (caspio.com)) in order to ascertain whether post-mitigation construction phase disturbance and displacement impacts may adversely affect the population size and / or distribution of each SCI and thereby result in potential for AESI.

677. The rationale to determine average numbers of individuals predicted to be impacted by disturbance and displacement effects from construction phase activities within the OECC intertidal landfall area is presented in Section 10.10.2. of **EIA Chapter 10: Ornithology**, with average numbers of each SCI recorded during baseline surveys and average numbers of each SCI impacted taken from Table 10-51 Section 10.10.2

678. In all cases acoustic and visual disturbance predictions presented in **Table 2-12** are based upon the most potentially impactful cable installation scenario through the intertidal area for each receptor, either for cables being installed around a central alignment within the OECC intertidal landfall area (the preferred alignment scenario), or for cables installed with maximum separation distances within the OECC intertidal landfall area (the Alternative Alignment for the purposes of Modelling scenario).

679. Within the April to August period, the proportion of individuals of each species available to acoustic and visual impacts are reduced to <0.5% for all SCIs for acoustic disturbance and to <0.2% for all SCIs for visual disturbance, with the exception of oystercatcher (7.56%) and curlew (2.83%) (**Table 2-13**). As per the relative metrics used to determine the level of impact to any given SCI as part of the impact assessment, any impact of <5% is considered to be “very small”. Furthermore,

680. Within the April to August period, the proportions of individuals of each SCI species available to acoustic and visual impacts are reduced (**Table 2-13**) to <0.5% for all SCIs for acoustic disturbance and to <0.2% for all SCIs for visual disturbance, with the exception of oystercatcher (7.56%) and curlew (2.83%). Going by the relative metrics used to quantify proportional impacts to SCIs, the proportion of oystercatchers considered to be available to visual disturbance is considered to be “small” (i.e. between 5% and 10%). Furthermore, this proportion is further reduced to “very small” (4.55%) when assessed against the PA scenario as opposed to the maximally precautionary AAM scenario. For curlew, under the AAM scenario, the proportion of individuals assessed to be available for visual disturbance (2.83%) is “very small” (i.e., <5%). This is reduced further to 1.54% when this SCI is assessed against the PA scenario.

681. As such, there is no potential for construction phase disturbance and displacement impacts to adversely affect the population or distributions of these SCIs of the North Bull Island SPA, as they occur within South Dublin Bay on an ex situ basis, in such a way as to result in AESI.

Table 2-13: Average numbers of each wintering waterfowl and wader SCI experiencing potential disturbance from acoustic and visual stimuli should works be restricted to occurring between April and August, inclusive, compared to average numbers present within the South Dublin Bay section of the functionally connected South Dublin Bay and River Tolka Estuary SPA throughout the year and annual mean peak numbers across the wider Dublin Bay I-WeBS recording area

SCI	Average number recorded during diurnal baseline surveys (across all 81 surveys)	Average number recorded during diurnal baseline surveys (across surveys during April to August period – 27 surveys)	Dublin Bay 10-year mean peak 2011/12–20/21	Acoustic Impacts			Visual Impacts		
				Average number experiencing disturbance from acoustic effects of single piling event (across surveys during April to August period – 27 surveys)	Average proportion of individuals recorded during diurnal baseline surveys impacted (across all 81 surveys)	Average proportion of Dublin Bay 10-year mean peak 2011/12–20/21 impacted	Average number experiencing disturbance from visual effects of all activities from intertidal cable landfall (across surveys during April to August period – 27 surveys)	Average proportion of individuals recorded during diurnal baseline surveys impacted (across all 81 surveys)	Average proportion of Dublin Bay 10-year mean peak 2011/12–20/21 impacted
Light-bellied brent goose	77.98	18.26	3747	19.93	25.56%	0.53%	14.64	18.77%	0.39%
Shelduck	5.49	4.63	1778	1.85	33.61%	0.10%	1.59	28.96%	0.09%
Teal	3.41	0.00	1439	0.00	0.09%	0.00%	0.00	0.00%	0.00%
Pintail	0.2	0.00	233	0.00	0.00%	0.00%	0.00	0.00%	0.00%
Shoveler	0.09	0.00	117	0.00	0.00%	0.00%	0.00	0.00%	0.00%
Oystercatcher	861.19	295.63	3115	50.88	5.91%	1.63%	235.43	27.34%	7.56%
Golden plover	24.14	0.00	1093	0.44	1.83%	0.04%	0.00	0.00%	0.00%
Grey plover	3.07	0.00	342	0.22	7.20%	0.06%	0.00	0.00%	0.00%
Knot	775.28	0.00	6277	136.83	17.65%	2.18%	0.00	0.00%	0.00%
Sanderling	53.06	3.56	549	0.04	0.08%	0.01%	0.08	0.15%	0.01%
Dunlin	596.75	0.00	7603	1.74	0.29%	0.02%	0.00	0.00%	0.00%
Black-tailed godwit	110.81	49.56	2121	1.38	1.24%	0.07%	0.22	0.20%	0.01%
Bar-tailed godwit	177.62	33.04	2119	4.26	2.40%	0.20%	0.74	0.42%	0.03%
Curlew	47.73	27.93	889	2.12	4.45%	0.24%	25.20	52.80%	2.83%
Redshank	166.7	21.07	2166	54.48	32.68%	2.52%	1.31	0.79%	0.06%
Turnstone	66.37	0.00	308	0.03	0.05%	0.01%	0.00	0.00%	0.00%

Residual impacts

682. With the implementation of mitigation as outlined above, given the very limited number of individuals potentially experiencing disturbance in relation to construction phase activities within intertidal areas of functionally connected South Dublin and River Tolka Estuary SPA, there is no potential for AESI to result from such activities to the listed SCIs of the North Bull Island SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-11**.

Project-only effect on site integrity conclusion for impact

683. The Conservation Objective and its attributes and targets for these SPA SCIs are presented in **Table 2-11**. With regards to disturbance and displacement impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for these SCIs and, in turn, that there is **no project-only AESI for these SPA SCIs.**

Construction phase impact 3 – Changes in prey availability

OECC Intertidal landfall

684. Changes in prey availability have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population trend (long-term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

Project-only assessment

685. Prey species upon which each of these wintering ornithological SCIs rely include invertebrates such as molluscs (including bivalves) and annelids (including polychaetes). The alteration of habitats which support the prey species of intertidal waterbirds (e.g., during preparation of the seabed for trenching and cabling activities, the burial of export cables within the intertidal zone and the presence of infrastructure footprints within the intertidal zone) have the potential to change the distribution, behaviour or accessibility of prey species for intertidal waterbirds through:

a. Increased suspended sediment levels may alter the distribution of fish and mobile invertebrate species should they respond to avoid areas of altered water column condition.

b. Alteration of habitats which support seabird prey species may reduce the capacity of those habitats to hold or produce intertidal waterbird prey species, thereby reducing the abundance of prey available to foraging intertidal waterbirds within and around impacted areas.

686. Given the proximity of North Bull Island SPA to South Dublin Bay, wader and waterfowl SCIs which utilise habitats within North Bull Island SPA are also likely over the course of the non-breeding periods in which they typically occupy the Dublin Bay area in greatest numbers, to use intertidal areas within South Dublin Bay and, as such may experience changes in prey availability impacts from construction phase activities within this area.

687. As assessed for the wader and waterfowl SCIs of the functionally connected South Dublin Bay and River Tolka Estuary SPA (**Section 2.2.4**), approximately 0.72% of the total intertidal area available for

foraging within the South Dublin Bay is subject to temporary disturbance of habitat during the construction phase of the proposed intertidal landfall works. As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during construction activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

688. It is therefore considered that there is no potential for AESI to result from changes in prey availability during construction phase activities within the OECC intertidal landfall area in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-11**.

Proposed mitigation

689. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

690. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

691. The Conservation Objective and its attributes and targets for these SPA SCIs are presented in **Table 2-11**. With regards to changes in prey availability impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for these SCIs and, in turn, that there is **no project-only AESI for these SPA SCIs.**

Operation and Maintenance Phase Impacts

Operation and maintenance impact 1 – Direct effects on habitat

OECC Intertidal landfall

Project-only assessment

692. Given the proximity of North Bull Island SPA to South Dublin Bay, wader and waterfowl SCIs which utilise habitats within North Bull Island SPA are also likely over the course of the non-breeding periods in which they typically occupy the Dublin Bay area in greatest numbers, to use intertidal areas within South Dublin Bay and, as such may experience direct effects on habitat impacts from operation and maintenance phase activities within this area.

693. Impacts considered to be direct effects on habitat may arise as a consequence of maintenance activities which temporarily remove or alter areas of intertidal habitat which are utilised by these SCIs in ex situ areas of South Dublin Bay. Cable landfall duct maintenance activities and potential cable repair works during the operation and maintenance phase within South Dublin Bay have the potential to alter areas of intertidal habitat such that they become temporarily unavailable to these SCIs connected with North Bull Island SPA, which may otherwise utilise those areas for ex situ non-foraging behaviours.

694. Direct effects on habitat have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population trend (long-term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

695. In relation to these Conservation Objective attributes, operation and maintenance of the CWP Project OECC intertidal landfall may result in temporary reductions in the spatial extent of the ex situ intertidal areas within South Dublin Bay in which individuals from North Bull Island SPA can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of operation and maintenance phase activities within the OECC intertidal landfall may directly affect demographic parameters (for example, use of alternative roosting areas may increase vulnerability to predation and reduce survival rates), or may affect the energetic costs of non-foraging behaviours through increased occupancy of sub-optimal area and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

696. Despite the above potential pathways to impact, as the spatial extent of any ex situ temporary direct effects on intertidal habitats from maintenance activities will be, at most extremely localised, should extraction and reinstatement of intertidal areas be required, the level of impact is not considered capable of altering the extent of available ex situ habitat in such a way as to result in a significant decline in the populations of these SCIs of North Bull Island SPA. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation conditions of these SCIs of North Bull Island SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to North Bull Island SPA.

Proposed mitigation

697. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

698. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

699. The Conservation Objective and its attributes and targets for these SPA SCIs are presented in **Table 2-11**. With regards to direct effects on habitat impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for these SCIs and, in turn, that there is **no project-only AESI for these SPA SCIs.**

Operation and maintenance phase impact 2 – Disturbance and displacement

Array site (barrier effects only)

Project-only assessment

700. Disturbance and displacement have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population trend (long-term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

701. Disturbance and displacement impacts to these migrant SCIs arising from the array site during the operation and maintenance phase are limited to barrier effects, i.e., the possibility they need to fly around the turbines during their annual migrations.

702. For migratory species, one-off energetic costs associated with relatively small deviations (such as travelling around the array site, rather than straight through) during typically large migratory movements are considered to be inconsequential in relation to energy reserves recruited for migration (Masden et al., 2009).

703. Therefore, the potential magnitude of impact on birds that only migrate through the array site (including waders and estuarine waterbirds) is considered negligible.

704. Consequently, there is assessed to be no potential for AESI to result from disturbance and displacement in the form of barrier effects during the operation and maintenance phase at the array site in relation to the Conservation Objectives and attributes and targets for these SCIs as stated in **Table 2-11**.

Proposed mitigation

705. No specific mitigation is proposed, or required, in respect of disturbance and displacement during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

706. As per project-only assessment, above.

OECC Intertidal landfall

Project-only assessment

707. Given the proximity of North Bull Island SPA to South Dublin Bay, wader and waterfowl SCIs which utilise habitats within North Bull Island SPA are also likely over the course of the non-breeding periods in which they typically occupy the Dublin Bay area in greatest numbers, to use intertidal areas within South Dublin Bay and, as such may experience disturbance and displacement impacts from operation and maintenance phase activities within this area.

708. Following installation of the OECC through the intertidal zone from the transition zone to the TJBs at the landfall location, the operational nature of any buried infrastructure within the functionally

connected South Dublin Bay and River Tolka Estuary SPA is passive. Any routine visual inspection of the OECC does not extend to buried infrastructure within the SPA.

709. It is possible that unplanned maintenance may be required on buried infrastructure within the SPA during the operational phase of the project. In relation to these Conservation Objective attributes, any such unplanned maintenance activities have the potential to cause disturbance and displacement to common tern within the vicinity of the impacted area. It is considered, however, that any unplanned maintenance activities on buried infrastructure within South Dublin Bay during the operational phase of the project would be restricted in terms of their frequency, temporal duration and spatial scale, resulting in discrete areas of a visual disturbance of ~250m radius.

710. Given the extent of intertidal habitat available to the SCIs, the short temporal duration of any unplanned maintenance activities and the passive nature of the operation of buried infrastructure within the functionally connected South Dublin Bay and River Tolka Estuary SPA, it is considered such that there is no potential for AESI to these SCIs as a result of ex situ disturbance and displacement impacts during the operation and maintenance phase around the OECC intertidal landfall in relation to the North Bull Island SPA Conservation Objectives, attributes and targets outlined in **Table 2-11**.

Proposed mitigation

711. No specific mitigation is proposed, or required, in respect of disturbance and displacement during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

712. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

713. The Conservation Objective and its attributes and targets for these SPA SCIs are presented in **Table 2-11**. With regards to disturbance and displacement impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for these SCIs and, in turn, that there is **no project-only AESI for these SPA SCIs.**

Operation and maintenance phase impact 3 – Changes in prey availability

OECC Intertidal landfall

Project-only assessment

714. Changes in prey availability have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population trend (long-term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

715. The Conservation Objective attributes have the potential to be impacted through a reduction in prey availability due to:

a. Increased suspended sediment levels may temporarily alter the distribution of fish and mobile invertebrate species should they respond to avoid areas of altered water column condition.

b. Alteration of habitats which support prey species may reduce the capacity of those habitats to hold or produce prey species, thereby reducing the abundance of prey available to foraging seabirds within and around impacted areas.

716. Given the proximity of North Bull Island SPA to South Dublin Bay, wader and waterfowl SCIs which utilise habitats within North Bull Island SPA, are also likely over the course of the non-breeding periods in which they typically occupy the Dublin Bay area in greatest numbers, to use intertidal areas within South Dublin Bay and, as such may experience changes in prey availability impacts from operation and maintenance phase activities within this area.

717. As assessed for the wader and waterfowl SCIs of the functionally connected South Dublin Bay and River Tolka Estuary SPA (**Section 2.2.4**), approximately 0.72% of the total intertidal area available for foraging within the South Dublin Bay is subject to temporary disturbance of habitat during the construction phase of the proposed intertidal landfall works. The scale of any maintenance to buried infrastructure carried out during the operation and maintenance phase will likely be considerably smaller than that during cable installation during the construction phase. As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during operation and maintenance activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

718. It is therefore considered that there is no potential for AESI to result from changes in prey availability during operation and maintenance phase activities within the OECC intertidal landfall area in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-11**.

Proposed mitigation

719. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

720. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

721. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-11**. With regards to changes in prey availability during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance impact 4 – Collision

Array site

Project-only assessment

722. Collision impacts have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population trend (long-term population trend stable or increasing).

723. Estimated collision mortality for these non-breeding wader and waterbird SCIs of North Bull Island SPA, which may pass through the array site during migratory movements, are presented in **Table 2-14**. These values are derived from total collision mortality figures for each species (as determined in **Appendix 10.3 Collision Risk Modelling** of the EIAR), apportioned on the basis of the SPA population (a 10-year mean-peak – 2011 / 12–20 / 21 from the I-WeBS Site Summary Table for 0U404 Dublin Bay [available at Site Summary Tables_S27 (caspio.com)]) as a proportion of the wider regional flyway population (Burke et al., 2019).

724. For example, for regional migratory CRM, total collision mortality impacts to light-bellied brent goose are estimated as 0.04 per annum. As the annual mean-peak population of this SCI in the Dublin Bay area is 10.66% of the all-Ireland regional population, of the 0.04 collision mortalities per annum, a total 0.004 (10.66%) collision mortalities per annum are apportioned to the North Bull Island SPA light-bellied brent goose population. This then translates to an increase in baseline mortality of <0.001%.

725. Additional mortalities apportioned to North Bull Island SPA were then compared to mean-peak populations of each SCI within the wider Dublin Bay I-WeBS area to ascertain whether additional mortality may result in AESI.

Table 2-14: Total annual collision mortalities to wildfowl and wader SCIs of North Bull Island SPA, mortalities apportioned to the SPA for each SCI, and apportioned collision mortalities as a proportion of the Dublin Bay 10-year mean-peak I-WeBS counts for each SCI

SCI	10-year mean-peak I-WeBS count 2011/12–20/21	Regional population (All Ireland)	Proportion of regional population	Total impact		Impact apportioned to SPA		Impact as proportion of Dublin Bay I-WeBS area mean peak	
				Option A	Option B	Option A	Option B	Option A	Option B
Light-bellied brent goose	3747	35150	10.66%	0.04	0.035	0.004	0.004	0.000%	0.000%
Shelduck	1778	10160	17.50%	0.159	0.142	0.028	0.025	0.002%	0.001%
Teal	1439	35740	4.03%	2.792	2.446	0.112	0.098	0.008%	0.007%
Pintail	233	1570	14.84%	0.124	0.106	0.018	0.016	0.008%	0.007%
Shoveler	117	2240	5.22%	0.067	0.058	0.003	0.003	0.003%	0.003%
Oystercatcher	3115	60540	5.15%	0.25	0.217	0.013	0.011	0.000%	0.000%
Golden plover	1093	92060	1.19%	0.828	0.731	0.010	0.009	0.001%	0.001%
Grey plover	342	2940	11.63%	0.004	0.004	0.000	0.000	0.000%	0.000%
Knot	6277	16270	38.58%	0.109	0.097	0.042	0.037	0.001%	0.001%
Sanderling	549	8420	6.52%	0.055	0.049	0.004	0.003	0.001%	0.001%
Dunlin	7603	45760	16.61%	0.617	0.549	0.103	0.091	0.001%	0.001%
Black-tailed godwit	2121	19800	10.71%	0.19	0.167	0.020	0.018	0.001%	0.001%
Bar-tailed godwit	2119	16530	12.82%	0.01	0.008	0.001	0.001	0.000%	0.000%
Curlew	889	35240	2.52%	0.092	0.08	0.002	0.002	0.000%	0.000%
Redshank	2166	23800	9.10%	0.147	0.129	0.013	0.012	0.001%	0.001%
Turnstone	308	16270	1.89%	0.105	0.094	0.002	0.002	0.001%	0.001%

726. Although these migratory wildfowl and wader SCIs from North Bull Island SPA may pass through the array site, any collision mortality to these SCIs would be negligible (0.008% or less than Dublin Bay 10 year mean peak counts). Collision impacts will therefore not result in an AESI in relation to the Conservation Objective and attributes and targets for these SCIs as stated in **Table 2-11**. Specifically, any such negligible increase to baseline mortality is considered not to affect the long-term population trend of these SCIs in such a way as to result in its decline. Thereby, collision impacts to these SCIs of North Bull Island SPA will not adversely affect the Conservation Objectives of the SPA to maintain the favourable conservation condition of the SCIs.

Proposed mitigation

727. No specific mitigation is proposed, or required, in respect of collision during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

728. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

729. The Conservation Objective and its attributes and targets for these SPA SCIs are presented in **Table 2-11**. With regards to collision impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for these SCIs and, in turn, that there is **no project-only AESI for these SPA SCIs.**

2.3.2 Receptor 17: Black-headed gull

Construction Phase Impacts

Construction phase impact 1 – Direct effects on habitat

Array site

Project-only assessment

730. With regards to the array site, relevant construction phase direct effects on habitat relate to the alteration of sea surface areas as they become occupied by the footprint of installed infrastructure and, therefore, unavailable for use by seabird SCIs to undertake non-foraging behaviours.

731. As construction of the array site progresses through its planned duration of approximately 2.5 years, the above sea level spatial extent of infrastructure will increase to a maximum of less than 0.005 km^2 within the array site (i.e., combined sea level area of all WTGs and OSSs). This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population trend (long-term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

732. In relation to these Conservation Objective attributes, construction within the array site may reduce the marine areas in which individuals can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of construction phase activities within the array site may affect the energetic costs of non-foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

733. Given its designation as a wintering feature, the black-headed gull SCI of the North Bull Island SPA is not functionally connected to the array site, i.e., it is not a central-place forager during the non-breeding period. Non-breeding season black-headed gulls are more widely dispersed within the marine environment, utilising a significantly larger regional extent of sea area than during the breeding season. The spatial extent of less than 0.005 km^2 of above sea level infrastructure within the array area represents a tiny proportion of the marine areas utilised by this receptor during the non-breeding period.

734. In the context of the area of available habitat, and the negligible area that will be lost within the array site during construction, the scale of direct effects on habitat within the array site is considered to be negligible.

735. When considering the Conservation Objectives it is assessed that there will be no potential for construction phase direct effects on habitat to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

736. No specific mitigation is proposed, or required, in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

737. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

738. Impacts considered to be direct effects on habitat may arise as a consequence of activities which temporarily disturb areas of intertidal habitat which are utilised by ornithological SCIs. There is no direct loss or removal of intertidal habitat proposed by the CWP project. Direct effects to intertidal areas which may be utilised by birds for non-foraging behaviours (such as roosting, loafing and maintenance) are considered only to relate to the physical footprint of the proposed intertidal infrastructure and works (i.e. the intertidal cable route during construction and any infrastructure at the proposed landfall location).

739. Although North Bull Island does not directly overlap with the OECC as it passes through the intertidal landfall area, direct effects on intertidal habitat have the potential to impact on this SCI in an ex situ capacity, due to its functional connectivity to the adjacent South Dublin Bay and River Tolka Estuary SPA. The following Conservation Objective attributes and targets for this SPA SCI:

- Population trend (long-term population trend stable or increasing); and

- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

740. In relation to these Conservation Objective attributes, construction within the OECC landfall area may temporarily reduce the ex situ areas in which individuals may otherwise undertake non-foraging behaviours (such as roosting) or require individuals to use alternative areas for these non-foraging behaviours. These impacts may affect energetic costs of non-foraging behaviours, which may in turn affect condition of individuals and survival rates.

741. The spatial extent of intertidal habitat within South Dublin Bay and River Tolka Estuary SPA is 21.94 km^2. Approximately 0.16 km^2 of intertidal habitat within South Dublin Bay is estimated to be subject to direct effects as a result of intertidal cable landfall activities (0.04 km^2 from open cut landfall cable duct installation, 0.006 km^2 from cofferdam installation, and 0.11 km^2 from cable laying activities in the transition zone). This equates to approximately 0.72% of the total intertidal habitat area within the SPA being subject to temporary direct effects on habitat during the construction phase of the proposed intertidal landfall works.

742. Following the backfilling of any excavated sections of trenching and removal of any supporting vehicles and / or infrastructure, it is considered that the re-establishment of intertidal habitat available to birds for non-foraging activities would occur rapidly due to the dynamic nature of intertidal habitats within South Dublin Bay. Any effects on the physical habitat around active intertidal construction loci would be brief, lasting less than several tidal cycles. Intertidal mudflats are considered resilient to isolated physical disturbances and can recover well (OSPAR, 2023).

743. The total area anticipated to be subject to temporary direct effects on habitat during the construction phase of the proposed intertidal landfall works equates to 0.72% of the intertidal SPA habitat available to black-headed gulls. Given this proportion will be even smaller at any given moment in time during trenching activities, and given the rate of recoverability of available habitat following backfilling and removal of supporting infrastructure and / or vehicles, there will be no potential for construction phase disturbance and displacement impacts to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI.

744. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

745. No specific mitigation is proposed, or required, in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

746. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

747. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-11**. With regards to direct effects on habitat impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Construction phase impact 2 – Disturbance and displacement

OECC (Intertidal landfall)

Project-only assessment

748. Given the proximity of North Bull Island SPA to South Dublin Bay, black-headed gull which utilise habitats within North Bull Island SPA are considered to be functionally connected and therefore likely to use intertidal areas within South Dublin Bay over the course of the non-breeding periods in which they typically occupy the area in greatest numbers. As such, this SCI may experience ex situ disturbance and displacement impacts from construction phase activities within this area.

749. Disturbance and displacement have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population trend (long-term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

750. In relation to these Conservation Objective attributes, construction within the OECC intertidal landfall area may temporarily reduce the areas in which individuals can undertake foraging or non-foraging behaviours (such as roosting). These impacts may affect energetic costs of such behaviours, which may in turn affect condition of individuals and survival rates.

751. Disturbance and displacement impacts to the black-headed gull SCI of North Bull Island on an ex situ basis as they occur within intertidal areas of the adjacent South Dublin Bay and River Tolka Estuary SPA during construction periods area assessed in relation to the potential for disturbance to result from acoustic and visual stimuli as per described for wader and waterbird SCIs in **Section 2.2.4**.

752. Acoustic and visual stimuli associated with any given construction activity during diurnal periods (i.e., outside periods in which receptors are nocturnally roosting) at any given time of year are predicted to, on average, impact numbers of black-headed gull as shown in **Table 2-15**. These numbers of impacted individuals are compared to the average number of each species observed within the South Dublin Bay part of the South Dublin Bay and River Tolka Estuary SPA during all diurnal baseline surveys (as outlined in **Technical Appendix 10.5: Baseline Characterisation Report** of the EIAR) and the 10 year mean-peak of each species within the wider Dublin Bay I-WeBs recording area (which also includes North Bull Island SPA, taken from the Site Summary Table for 0U404 Dublin Bay: available at Site Summary Tables S27 (caspio.com)) in order to ascertain whether construction phase disturbance and displacement impacts may adversely affect the population size and/or distribution of this SCI and thereby result in potential for AESI.

753. As with the assessment of acoustic and visual anthropogenic disturbance which was carried out for wader and waterbird SCIs of the functionally connected South Dublin Bay and River Tolka Estuary SPA, numbers and proportions of the black-headed gull SCI of North Bull Island SPA impacted by acoustic and/or visual disturbance within the OECC intertidal landfall study area have been calculated on the basis of information known about this species' sensitivity to acoustic and/or visual anthropogenic disturbance and areas which are predicted to be impacted by visual and/or acoustic disturbance during the construction phase of the CWP Project.

754. Given the proximity (North Bull Island SPA abuts South Dublin Bay and River Tolka Estuary SPA at its southern extent) and functional connectivity (it is conservatively assumed for assessment purposes that up to 100% of SCIs within North Bull Island SPA may utilise habitats within South Dublin Bay and River Tolka Estuary SPA), it is considered that the black-headed gull SCI of North Bull Island SPA

may experience ex situ disturbance and displacement impacts as a result of anthropogenic visual and acoustic disturbance within South Dublin Bay.

755. Black-headed gull is considered to be of low sensitivity to visual and acoustic disturbance impacts (Goodship & Furness, 2019). Acoustic and visual stimulus thresholds (i.e., the noise levels generated by and distances from disturbance-inducing anthropogenic activities to which ornithological receptors may react to their species-specific sensitivity levels) are provided in **Table 2-6**, **Section 2.2.4**.

756. As per the assessment which was carried out for South Dublin Bay and River Tolka Estuary SPA, and on the basis of functional connectivity with North Bull Island SPA (expressed as the conservative assumption that up to 100% of North Bull Island SPA SCIs may utilise habitats within the former), information available in relation to both noise and visual impacts generated by activities associated with the CWP Project within the OECC intertidal landfall area and overlap between areas predicted to be subject to such impacts, as they are described in **Table 2-6**, **Section 2.2.4**, have been assessed against occurrences of the North Bull Island black-headed gull SCI as recorded within the OECC intertidal landfall study area (on the basis of ex situ utilisation) during the baseline survey period (and against the I-WeBS 10-year mean peak count from 2011/12 to 2020/21), to give numbers and proportions of each SCI predicted to be impacted by acoustic and visual anthropogenic disturbance as they occur at levels to which these individual species are sensitive (**Table 2-15**).

757. In the case of the black-headed gull SCI of North Bull Island (as it occurs on an ex situ basis within South Dublin Bay and River Tolka Estuary SPA), acoustic and visual disturbance predictions presented in **Table 2-15** are based upon the most potentially impactful cable installation scenario through the intertidal area for this receptor, either for cables being installed around a central alignment within the OECC intertidal landfall area (the preferred alignment scenario), or for cables installed with maximum separation distances within the OECC intertidal landfall area (AAM scenario).

Table 2-15: Average numbers of black-headed gull experiencing potential disturbance from acoustic and visual stimuli compared to average numbers present within the South Dublin Bay section of the South Dublin Bay and River Tolka Estuary SPA (taken as reference for ex situ disturbance for SCIs from North Bull Island SPA) and mean peak numbers across the wider Dublin Bay I-WeBS recording area

SCI	Average number recorded during diurnal baseline surveys (across all 81 surveys)	Dublin Bay 10-year mean peak 2011/12–20/21	Acoustic Impacts			Visual Impacts		
			Average number experiencing disturbance from acoustic effects of single piling event	Average proportion of individuals recorded during diurnal baseline surveys impacted	Average proportion of Dublin Bay 10-year mean peak 2011/12–20/21 impacted	Average number experiencing disturbance from visual effects of all activities from intertidal cable landfall	Average proportion of individuals recorded during diurnal baseline surveys impacted	Average proportion of Dublin Bay 10-year mean peak 2011/12–20/21 impacted
Black-headed gull	753.3	3131	2.03	0.27%	0.06%	81.07	10.76%	2.59%

758. For black-headed gull, the average number of individuals assessed as being present to experience potential disturbance in relation to acoustic impacts is low (2.03), whilst the average number of individuals assessed to experience potential disturbance in relation to visual impacts is 81.07.

759. Gulls, in general, are extremely adaptable, typically demonstrating a high level of tolerance and habituation to human activities (Calladine et al., 2006). This adaptability, along with a high degree of flexibility in their usage of habitats, provides these species with an ability to adapt to very high levels of visual and acoustic disturbance which may arise as a result of anthropogenic activities. Black-headed gull is assessed as having a low sensitivity to disturbance from people in intertidal habitats (Goodship & Furness, 2019).

760. It is considered, therefore, that of the numbers of black-headed gull available for experiencing disturbance, the numbers actually disturbed will be low due to their low sensitivity.

761. When considering the Conservation Objectives it is assessed that there will be no potential for construction phase disturbance and displacement impacts to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

762. No specific mitigation is proposed, or required, in respect of disturbance and displacement during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

763. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

764. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-11**. With regards to disturbance and displacement during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Table 2-16: Average numbers of black-headed gull experiencing potential disturbance from acoustic and visual stimuli should works be restricted to occurring between April and August, inclusive within the South Dublin Bay and River Tolka Estuary SPA, compared to average numbers present within the South Dublin Bay section of the South Dublin Bay and River Tolka Estuary SPA (taken as reference for ex situ disturbance for SCIs from North Bull Island SPA)throughout the year and annual mean peak numbers across the wider Dublin Bay I-WeBS recording area

SCI	Average number recorded during diurnal baseline surveys (across all 81 surveys)	Average number recorded during diurnal baseline surveys (across surveys during April to August period – 27 surveys)	Dublin Bay 10-year mean peak 2011/12–20/21	Acoustic Impacts			Visual Impacts		
				Average number experiencing disturbance from acoustic effects of single piling event (across surveys during April to August period – 27 surveys)	Average proportion of individuals recorded during diurnal baseline surveys impacted (across all 81 surveys)	Average proportion of Dublin Bay 10-year mean peak 2011/12–20/21 impacted	Average number experiencing disturbance from visual effects of all activities from intertidal cable landfall (across surveys during April to August period – 27 surveys)	Average proportion of individuals recorded during diurnal baseline surveys impacted (across all 81 surveys)	Average proportion of Dublin Bay 10-year mean peak 2011/12–20/21 impacted
Black-headed gull	831.73	499.33	3131	1.36	0.16%	0.04%	113.02	13.59%	3.61%

Construction phase impact 3 – Changes in prey availability

Array site and OECC

Project-only assessment

765. Changes in prey availability has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population trend (long-term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

766. Black-headed gull is a generalist and opportunist forager, whose diet comprises a range of fish and invertebrate species, as well as carrion and refuse. Although fish species (including gadoids, sprats and sandeels) are anticipated to be impacted by underwater noise during the construction phase, these species are not considered to form a key part of the black-headed gull's diet.

767. Mortality or injury-inducing underwater noise impacts to gadoids, sprats and sandeels (primarily in relation to pile driving for WTG and OSS foundation installation, and also UXO) are therefore not considered to have potential to result in population level consequences to black-headed gull.

768. In relation to these Conservation Objective attributes, there will be no potential for changes in prey availability during the construction phase to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI.

769. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

770. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

771. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

772. Black-headed gull is a generalist and opportunist forager, whose diet comprises a range of fish and invertebrate species, as well as carrion and refuse. Although fish species (including gadoids, sprats and sandeels) are anticipated to be impacted by underwater noise during the construction phase, these species are not considered to form a key part of the black-headed gull's diet.

773. Given the proximity of North Bull Island SPA to South Dublin Bay, black-headed gull which utilise foraging habitats within North Bull Island SPA are considered to be functionally connected and therefore likely to use intertidal foraging areas within South Dublin Bay over the course of the non-breeding periods in which they typically occupy the area in greatest numbers. As such, this SCI may

experience ex situ changes in prey availability impacts from construction phase activities within this area.

774. Construction phase activities within the OECC intertidal landfall area which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population trend (long-term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

775. These Conservation Objective attributes have the potential to be impacted through a reduction in prey availability due to:

a. Increased suspended sediment levels may temporarily alter the distribution of fish and mobile invertebrate species should they respond to avoid areas of altered water column condition.

b. Alteration of habitats which support prey species may reduce the capacity of those habitats to hold or produce prey species, thereby reducing the abundance of prey available to foraging seabirds within and around impacted areas.

776. The extent of intertidal areas (between MLWS and MHWS) within South Dublin Bay is approximately 21.94 km^2, within which approximately 0.16 km^2 (0.72%) are predicted to be disturbed during landfall cable installation (see **Chapter 4: Project Description**; **Section 4.8**). As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during construction activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

777. In relation to these Conservation Objective attributes, there will be no potential for changes in prey availability during the construction phase to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI.

778. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

779. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

780. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

781. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-11**, above. With regards to changes in prey availability during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and Maintenance Phase Impacts

Operation and maintenance impact 1 – Direct effects on habitat

Array site

Project-only assessment

782. With regards to the array site, relevant operation and maintenance phase direct effects on habitat relate to the occupation of sea surface areas by the footprint of operational infrastructure and therefore become unavailable for use by seabird SCIs to undertake non-foraging behaviours.

783. As operation and maintenance phase progresses through its planned duration of approximately 25 years, the above sea level spatial extent of infrastructure will at no point exceed 0.005 km^2 within the array site (i.e., combined sea level area of all WTGs and OSSs). This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population trend (long-term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

784. In relation to these Conservation Objective attributes, the presence of built infrastructure following the removal of previously available habitat may reduce the marine areas in which individuals can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of the spatial footprint of operational infrastructure within the array site may affect the energetic costs of non-foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

785. Given its designation as a wintering feature, the black-headed gull SCI of the North Bull Island SPA is not functionally connected to the array site, i.e., it is not a central-place forager during the non-breeding period. Non-breeding season black-headed gulls are more widely dispersed within the marine environment, utilising a significantly larger regional extent of sea area than during the breeding season. The spatial extent of less than 0.005 km^2 of above sea level infrastructure within the array area represents a tiny proportion of the marine areas utilised by this receptor during the non-breeding period.

786. In the context of the area of available habitat, and the negligible area that will be unavailable within the array site during the operation and maintenance phase, the scale of direct effects on habitat within the array site is considered to be negligible.

787. When considering the Conservation Objectives it is assessed that there will be no potential for operation and maintenance phase direct effects on habitat to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

788. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

789. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

790. Given the proximity of North Bull Island SPA to South Dublin Bay, black-headed gull which utilise habitats within North Bull Island SPA, are also likely over the course of the non-breeding periods in which they typically occupy the Dublin Bay area in greatest numbers, to use intertidal areas within South Dublin Bay and, as such may experience direct effects on habitat from operation and maintenance phase activities within this area.

791. Impacts considered to be direct effects on habitat may arise as a consequence of maintenance activities which temporarily remove or alter areas of intertidal habitat which are utilised by this SCI in ex situ areas of South Dublin Bay. Cable landfall duct maintenance activities and potential cable repair works during the operation and maintenance phase within South Dublin Bay have the potential to alter areas of intertidal habitat such that they become temporarily unavailable to black-headed gull connected with North Bull Island SPA, which may otherwise utilise those areas for ex situ non-foraging behaviours.

792. Direct effects on intertidal habitat have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population trend (long-term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

793. In relation to these Conservation Objective attributes, operation and maintenance of the CWP Project OECC intertidal landfall may result in temporary reductions in the spatial extent of the ex situ intertidal areas within South Dublin Bay in which individuals from North Bull Island SPA can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of operation and maintenance phase activities within the OECC intertidal landfall may directly affect demographic parameters (for example, use of alternative roosting areas may increase vulnerability to predation and reduce survival rates), or may affect the energetic costs of non-foraging behaviours through increased occupancy of sub-optimal area and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

794. Despite the above potential pathways to impact, as the spatial extent of any ex situ temporary direct effects on intertidal habitats from maintenance activities will be, at most extremely localised, should extraction and reinstatement of intertidal areas be required, the level of impact is not considered capable of altering the extent of available ex situ habitat in such a way as to result in a significant decline in the population of this SCI of North Bull Island SPA. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation conditions of the black-headed gull SCI of North Bull Island SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to North Bull Island SPA.

Proposed mitigation

795. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

796. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

797. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-11**. With regards to direct effects on habitat impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance phase impact 2 – Changes in prey availability

Array site and OECC

Project-only assessment

798. Given the proximity of North Bull Island SPA to South Dublin Bay, black-headed gull which utilise foraging habitats within North Bull Island SPA are considered to be functionally connected and therefore likely to use intertidal foraging areas within South Dublin Bay over the course of the non-breeding periods in which they typically occupy the area in greatest numbers. As such, this SCI may experience ex situ changes in prey availability impacts from operation and maintenance phase activities within this area.

799. Changes in prey availability has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population trend (long-term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

800. Black-headed gull is a generalist and opportunist forager, whose diet comprises a range of fish and invertebrate species, as well as carrion and refuse. Although fish species (including gadoids, sprats and sandeels) are anticipated to be impacted by underwater noise during the operation phase, these species are not considered to form a key part of the black-headed gull's diet.

801. In relation to these Conservation Objective attributes, maintenance activities during the operational phase of the CWP Project array site and OECC may impact black-headed gull prey species through underwater noise effects, increases to suspended sediment concentrations, removal or alteration of important benthic habitats for those prey species, or electromagnetic field effects affecting prey species distributions around electrical infrastructure. Should these impacts to prey species reduce the availability of those prey species to foraging black-headed gulls, this may result in effects to the demographic parameters, and resultant population dynamics, of this SCI through processes such as increased energetic consequences of foraging reducing individual condition and survival or productivity rates, or reduced provisioning rates to offspring reducing productivity rates. These

potential consequences may compromise the ability of the SCI to maintain its population, with prey availability changes potentially resulting in there being insufficient habitat to support the SCI's population on a long-term basis.

802. As operational phase activities within the array site and OECC will not include piling works or any other very high energy underwater noise inducing activities, and operational noise impact magnitudes to all potential prey species are assessed to be very low, there is not considered to be a pathway for operation and maintenance phase underwater noise impacts to have the potential to cause perceptible changes to prey availability in such a way that could impact this SCI.

803. Similarly, as operational phase activities within the array site do not routinely require disturbance of the seabed (in the form of trenching or dredging activities) except within localised areas in which this is necessary to facilitate repairs, increased SSC levels, are considered to occur only potentially infrequently and locally during the operational phase and there is no perceptible pathway for this impact to have the potential to cause changes to prey availability during the operational phase in such a way that could impact this SCI.

804. Prey species, upon which the SCI depredates, may experience the loss of up to 0.49 km^2 of previously available benthic habitat within the array site as a result of occupancy of the seabed by infrastructure during the operation and maintenance phase of the CWP Project. The spatial extent of such prey species habitat loss is, however, considered to be of negligible size in relation to this SCI's breeding and non-breeding season range extents.

805. During the operation and maintenance phase, one additional potential impact to seabird receptor prey species which does not occur during the construction phase is considered, namely EMF effects, associated with electricity passing along infrastructure cables. Any effects on fish are anticipated to occur within the immediate vicinity of the cable and effect levels are likely to be low in relation to background levels associated with the Earth's magnetic field. The magnitude of such impacts to potentially sensitive fish species are assessed as being very low. Consequently, there is not considered to be a pathway for operation and maintenance phase EMF impacts to have the potential to cause impacts to prey availability in such a way that could impact this SCI.

806. In the context of the extent of available habitat within foraging range of the SPA, the negligible proportion of that habitat in which potential impacts to prey species may occur, and that potential impacts to prey species may be of limited (if any) demographic consequence to their seabird predators, the scale of changes in prey availability impacts associated with operation and maintenance phase activities within the array site and OECC is considered to be negligible.

807. In relation to these Conservation Objective attributes, there will be no potential for changes in prey availability during the operation and maintenance phase to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI.

808. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

809. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

810. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

811. Black-headed gull is a generalist and opportunist forager, whose diet comprises a range of fish and invertebrate species, as well as carrion and refuse.

812. Given the proximity of North Bull Island SPA to South Dublin Bay, black-headed gull which utilise foraging habitats within North Bull Island SPA are considered to be functionally connected and therefore likely to use intertidal foraging areas within South Dublin Bay over the course of the non-breeding periods in which they typically occupy the area in greatest numbers. As such, this SCI may experience ex situ changes in prey availability impacts from operation and maintenance phase activities within this area.

813. Changes in prey availability has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population trend (long-term population trend stable or increasing); and
- Distribution (no significant decrease in the range, timing or intensity of use of areas other than that occurring from natural patterns of variation).

814. These Conservation Objective attributes have the potential to be impacted through a reduction in prey availability due to:

a. Increased suspended sediment levels may temporarily alter the distribution of fish and mobile invertebrate species should they respond to avoid areas of altered water column condition.

b. Alteration of habitats which support prey species may reduce the capacity of those habitats to hold or produce prey species, thereby reducing the abundance of prey available to foraging seabirds within and around impacted areas.

815. The extent of intertidal areas (between MLWS and MHWS) within South Dublin Bay is approximately 21.94 km^2, within which approximately 0.16 km^2 (0.72%) are predicted to be disturbed during landfall cable installation (**Chapter 4: Project Description**; **Section 4.8**). The scale of any maintenance to buried infrastructure carried out during the operation and maintenance phase will likely be considerably smaller than that during cable installation during the construction phase. As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during operation and maintenance activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

816. In relation to these Conservation Objective attributes, there will be no potential for changes in prey availability during the operation and maintenance phase to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI.

817. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

818. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

819. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

820. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-11**. With regards to changes in prey availability during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance impact 3 – Collision

Array site

Project-only assessment

821. During the operation and maintenance phase of the CWP Project the presence of operational WTGs within the array site may result in the mortality of this SPA SCI through the collision of individuals with turbine blades. Collision mortality has the potential to impact on the following Conservation Objective attribute and target for this SPA SCI:

- Population trend (long-term population trend stable or increasing).

822. In relation to this Conservation Objective attribute, mortality resultant from collision with operational WTGs within the array site may directly affect the overall survival rate of this SPA SCI. Furthermore, collision mortality may also adversely affect the overall productivity rate of this SPA SCI through reductions to offspring provisioning rates and other parental care metrics. These potential consequences may compromise the ability of the SCI to maintain its population on a long-term basis.

823. Flight activity by this SCI recorded within the array site during baseline surveys was extremely low throughout the baseline survey period (**Appendix 10.5: Baseline Characterisation Report** of the EIAR). Consequently, CRM has not been undertaken for this species on the basis that flight densities within the array site are extremely low and that resultant mortality rates to this SCI would be negligible.

824. As additional mortality to this SPA SCI resulting from collision with operational WTGs is estimated to represent only a negligible potential increase to SPA baseline mortality rates, this impact is considered not to impede the overall objective of maintaining / restoring the favourable conservation condition of the SPA SCI. Specifically, collision mortality will not affect the population dynamics of the SCI in such a way as to compromise its ability to maintain itself on a long-term basis as a viable component of its natural habitats. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

825. No specific mitigation is proposed, or required, in respect of collision during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

826. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

827. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-11**. With regards to collision impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Proposed mitigation

828. No specific mitigation is proposed, or required, in respect of collision during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

829. As per project-only assessment, above.

2.4 Dalkey Islands SPA (IE004172)

830. SPA is designated in relation to the following SCIs which have been screened in for consideration within the NIS: common tern, Arctic tern and roseate tern.

831. The minimum separation distance between SPA and the array site is 21.12 km.

832. The minimum separation distance between SPA and the OECC is 0.51 km.

833. The minimum separation distance between SPA and the OECC intertidal landfall is 7.41 km.

Table 2-17: Assessment of adverse effects on site integrity (project alone) - Dalkey Islands SPA

Objective: **Attributes and targets**	**Predicted effect**	**Link to assessment**	**Mitigation**	**Residual effect**	**Conclusion**
Objective: To maintain or restore the favourable conservation condition of the SCI(s): 1. Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats. 2. The natural range of the SCI is neither being reduced nor is likely to be reduced for the foreseeable future. 3. There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.	Common Tern [A193]				
	Direct effects on habitat [1, 3]	**Section 2.4.1**	None	No change	No AESI
	Disturbance and displacement [1, 3]		**Section 2.4.1**	**Section 2.4.1**	No AESI
	Changes in prey availability [1, 3]		None	No change	No AESI
	Collision [1]		None	No change	No AESI
	Introduction or spread of invasive species [1,3]	See high-level assessment in **Section 2.1**			No AESI
	Arctic tern [A194]				
	Direct effects on habitat [1, 3]	**Section 2.4.2**	None	No change	No AESI
	Disturbance and displacement [1, 3]		**Section 2.4.2**	**Section 2.4.2**	No AESI
	Changes in prey availability [1, 3]		None	No change	No AESI
	Collision [1]		None	No change	No AESI
	Introduction or spread of invasive species [1,3]	See high-level assessment in **Section 2.1**			No AESI
	Roseate tern [A192]				
	Direct effects on habitat [1, 3]	**Section 2.4.3**	None	No change	No AESI
	Disturbance and displacement [1, 3]		**Section 2.4.3**	**Section 2.4.3**	No AESI
	Changes in prey availability [1, 3]		None	No change	No AESI
	Collision [1]		None	No change	No AESI
	Introduction or spread of invasive species [1,3]	See high-level assessment in **Section 2.1**			No AESI

2.4.1 Receptor 1: Common tern

Construction Phase Impacts

Construction phase impact 1 – Direct effects on habitat

Array site

Project-only assessment

834. With regards to the array site, relevant construction phase direct effects on habitat relate to the alteration of ex situ sea-surface areas as they become occupied by the footprint of installed infrastructure and, therefore, unavailable for use by seabird SCIs to undertake non-foraging behaviours.

835. As construction of the array site progresses through its planned duration of approximately 2.5 years, the above sea level spatial extent of infrastructure will increase to a maximum of less than 0.005 km^2 within the array site (i.e., combined sea level area of all WTGs and OSSs). This ex situ direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

836. In relation to these Conservation Objective attributes, construction within the array site may reduce the ex situ marine areas in which individuals can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of construction phase activities within the array site may affect the energetic costs of non-foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

837. Despite the above potential pathways to impact, these direct effects on habitat do not affect any area of the SPA (and hence do not affect the distribution of foraging, roosting or breeding habitat of this SCI within the SPA). Further, the area of ex situ habitat loss represents a negligible proportion of sea area within the foraging range (mean-maximum + 1. S.D. = 26.9 km, Woodward et al., 2019) of common tern breeding within Dalkey Islands SPA and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

838. In the context of the area of available habitat within foraging range of the SPA, and the negligible proportion that will be lost ex situ within the array site during construction, the scale of direct effects on habitat within the array site is considered to be negligible. In particular, the reduction in ex situ marine areas in which to undertake non-foraging behaviours, or requirement to use alternative areas for non-foraging behaviours, is not expected to give rise to energetic costs of non-foraging behaviours in such a way as to affect the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of resulting in a significant decline in the breeding population abundance or passage population of the common tern SCI.

839. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of common tern in the SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on Dalkey Islands SPA.

Proposed mitigation

840. No specific mitigation is proposed, or required, in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

841. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

842. Given the proximity of Dalkey Islands SPA to South Dublin Bay, common tern which utilise habitats within Dalkey Islands SPA, are also likely over the course post-breeding period, in which they typically occupy the Dublin Bay area in greatest numbers, to use intertidal areas within South Dublin Bay and, as such, may experience ex situ direct effects on habitat from construction phase activities within this area.

843. Impacts considered to be direct effects on habitat may arise as a consequence of activities which temporarily disturb areas of ex situ intertidal habitat which are utilised by ornithological SCIs. There is no ex situ or in situ direct loss or removal of intertidal habitat proposed by the CWP project. Ex situ direct effects on intertidal areas which may be utilised by birds for non-foraging behaviours (such as roosting, loafing and maintenance) are considered only to relate to the physical footprint of the proposed intertidal infrastructure and works (i.e., the intertidal cable route during construction and any infrastructure at the proposed landfall location).

844. The non-foraging capacity in which the common tern SCI is considered primarily to use the ex situ intertidal habitat within South Dublin Bay is for roosting aggregations, especially during the post-breeding period (mid-July to early September).

845. Ex situ direct effects on intertidal habitat have the potential to impact on the following Conservation Objective attributes and targets for the common tern SCI of Dalkey Islands SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

846. In relation to these Conservation Objective attributes, construction in the OECC landfall area may temporarily reduce the ex situ areas in which individuals can undertake non-foraging behaviours (such as roosting) or require individuals to use alternative areas for these non-foraging behaviours. These impacts may affect energetic costs of non-foraging behaviours, which may in turn affect the condition of individuals and survival rates.

847. The spatial extent of ex situ intertidal habitat within South Dublin Bay and River Tolka Estuary SPA, which may act as supporting habitat for the tern SCIs of Dalkey Islands SPA, is 21.94 km^2. There will be no in situ direct effects on the Dalkey Islands SPA, the following analysis considers ex situ interactions in the South Dublin Bay and River Tolka Estuary SPA which may be utilised by this SPA SCI as a component of its broader natural range. Approximately 0.16 km^2 of intertidal habitat within South Dublin Bay and River Tolka Estuary SPA is estimated to be subject to direct effects as a result of intertidal cable landfall activities (0.04 km^2 from open cut landfall cable duct installation, 0.006 km^2 from cofferdam installation, and 0.11 km^2 from cable laying activities in the transition zone). This

equates to approximately 0.72% of the total ex situ intertidal habitat area within South Dublin Bay and River Tolka Estuary SPA being subject to temporary direct effects on habitat during the construction phase of the proposed intertidal landfall works.

848. Following the backfilling of any excavated sections of trenching and removal of any supporting vehicles and / or infrastructure, it is considered that the re-establishment of intertidal habitat available to birds for non-foraging activities would occur rapidly due to the dynamic nature of intertidal habitats within South Dublin Bay. Any effects on the physical habitat around active intertidal construction loci would be brief, lasting less than several tidal cycles. Intertidal mudflats are considered resilient to isolated physical disturbances and can recover well (OSPAR, 2023).

849. Despite the above potential pathways to impact, in the context of the negligible proportion of ex situ intertidal habitat which will be affected during construction and the short-term temporary nature of the effects to those habitats, the scale of direct effects on habitat within the OECC intertidal landfall area is considered to be negligible. In particular, the reduction in intertidal areas in which non-foraging behaviours are undertaken (including potential roosting areas used by common tern during the post-breeding period), or requirement to use alternative areas for non-foraging behaviours, is not expected to give rise to energetic costs of non-foraging behaviours in such a way as to affect the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of resulting in a significant decline in the breeding population abundance or passage population of the common tern SCI.

850. Similarly, temporary negligible short-term effects on the distribution of common tern ex situ roosting areas will not constitute any significant decline in relation to this Conservation Objective attribute.

851. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of common tern in the functionally connected South Dublin Bay and River Tolka Estuary SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the Dalkey Islands SPA.

Proposed mitigation

852. No specific mitigation is proposed, or required, in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

853. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

854. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-17**. With regards to direct effects on habitat impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Construction phase impact 2 – Disturbance and displacement

OECC (Intertidal landfall)

Project-only assessment

855. Given the proximity of Dalkey Islands SPA to South Dublin Bay, common tern which utilise habitats within Dalkey Islands SPA, are also likely to use ex situ intertidal areas within South Dublin Bay over the course of the post-breeding period, in which they typically occupy the wider South Dublin Bay area in greatest numbers. As such, common tern may experience ex situ disturbance and displacement from construction phase activities within this area.

856. Common tern, Arctic tern and roseate tern are three closely related and morphologically similar species. During the post-breeding period and given the low-light conditions in which these species may utilise the ex situ intertidal habitats of South Dublin Bay to form nocturnal roosting aggregations, it was generally not possible to differentiate these species during baseline surveys which were used to determine the number of individuals of these SCIs which may experience disturbance and displacement during crepuscular or nocturnal construction phase activities within the intertidal part of the OECC. Consequently, these species are considered collectively in relation to construction phase disturbance and displacement at the OECC intertidal landfall location. This means that when the impact values for *Sterna* terns are related to the population size of a particular species, the estimates of the proportions impacted are very precautionary.

857. Disturbance and displacement of terns roosting within, or otherwise using, supporting habitat within South Dublin Bay have the potential to impact on the following Conservation Objective attributes and targets for the common tern SCI of Dalkey Islands SPA on an ex situ basis:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

858. In relation to these Conservation Objective attributes, construction within the OECC intertidal landfall area may temporarily reduce the ex situ areas in which individuals can undertake non-foraging behaviours (such as roosting) or require individuals to use alternative areas for these non-foraging behaviours. These impacts may affect energetic costs of such non-foraging behaviours, which may in turn affect condition of individuals and survival rates.

859. Acoustic stimuli associated with any given piling event during daylight hours, when terns are not forming nocturnal roosting aggregations within South Dublin Bay (from sunrise until approximately two hours before sunset (Tierney et al., 2016)), will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within ex situ intertidal habitat within the vicinity of the OECC intertidal landfall area (up to 0.3 individuals where the greatest extent of mobile construction activities (i.e. Alternative Alignment for the purposes of Modelling scenario) are implemented). This represents a up to 1.07% of the average number of *Sterna* terns present within ex situ intertidal habitat within the South Dublin Bay section of the South Dublin Bay and River Tolka Estuary SPA during diurnal baseline surveys (28.02 individuals), up to 0.03% of the SPA common tern breeding population (988 individuals – 2016 count, SMP 2023) and <0.01% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013–2018 (7,364 individuals - see Table 3.4 in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

860. Visual stimuli associated with intertidal cable route installation activities between sunrise and approximately two hours before sunset, will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within ex situ intertidal habitat within the vicinity of the OECC

intertidal landfall area (up to 2.88 individuals for the most impactful cable laying route selection). This represents a up to 10.26% of the average number of *Sterna* terns present within ex situ intertidal habitat within the South Dublin Bay section of the South Dublin Bay and River Tolka Estuary SPA during diurnal baseline surveys (28.02 individuals), up to 0.29% of the SPA common tern breeding population (988 individuals – 2016 count, SMP 2023) and 0.04% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013–2018 (7,364 individuals - see Table 3.4 in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

861. As such, given the very limited number of individuals potentially experiencing ex situ disturbance in relation to diurnal construction phase activities within intertidal areas of the functionally connected South Dublin and River Tolka Estuary SPA, there is no potential for AESI to result from such activities to the common tern SCI of Dalkey Islands SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-17**.

862. Should, however, construction activities be undertaken during periods in which *Sterna* terns form post breeding roosting aggregations within South Dublin Bay (specifically between one hour before sunset through to sunrise, from mid-July to September, inclusive), acoustic and visual stimuli from such activities may result in potential ex situ disturbance impacts to larger numbers of *Sterna* terns within intertidal areas of South Dublin Bay, than if activities were conducted outside of these periods.

863. Unlike during diurnal periods, for which information relating to the ecological sensitivity of *Sterna* terns to visual and acoustic stimuli is available, disturbance responses of nocturnal roosting terns to such stimuli are unknown. As such, in the absence of being able to overlap disturbance effect ranges with receptor distributions, to inform the assessment of potential ex situ disturbance and displacement impact magnitudes to roosting tern receptors from Dalkey Islands SPA for intertidal cable installation scenarios, the distribution of potential acoustic (piling) and visual (cable route laying) nocturnal disturbance sources are compared to roosting tern aggregation locations noted during baseline post-breeding tern aggregation surveys and roosting tern aggregation locations which have been noted during other surveys of South Dublin Bay (**Figure 2-3** to **Figure 2-5**).

864. This comparison of ex situ tern roosting locations and cable route infrastructure indicates that, should cable route installation activities be undertaken during periods where roosting terns occupy roost sites, whilst there is uncertainty on the magnitude of the impact, there is the potential for disturbance impacts to large or very large proportions of large or very large numbers of roosting individuals within South Dublin Bay.

865. As such, despite the limited duration of potential acoustic and visual disturbance impacts, there is assessed to be the potential for AESI to result from such activities to the common tern SCI of Dalkey Islands SPA when considering the conservation objectives, attributes and targets outlined in **Table 2-17**.

Proposed mitigation

866. As ex situ intertidal habitats within South Dublin Bay are primarily used by *Sterna* tern species during their post-breeding migration periods (mid-July to late September) as nocturnal roosting areas, additional mitigation in the form of daily temporal restrictions (during the mid-July to late August period) is considered to be effective to ensure no AESI to the common tern SCI of the Dalkey Islands SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-17**.

867. It should be noted that whilst it is not possible to quantify the reduction in the ex situ impact through the implementation of this mitigation, the level of ex situ impact with the mitigation in place can be certain.

868. Full details of this daily temporal restriction additional mitigation are as follows:

- No construction phase cable route installation or associated activities, including preparatory works, will be undertaken between one hour prior to sunset and the following sunrise within the South Dublin Bay area during the period of mid-July to August, inclusive; and
- This area corresponds with the extent of intertidal habitat (areas between mean low water springs (MLWS) and MHWS) within the South Dublin Bay part of the functionally connected South Dublin Bay and River Tolka Estuary SPA, and also includes a small area of terrestrial habitat covering the Goose Green area at Poolbeg.

Residual impacts

869. With the daily temporary restrictions applied during the post-breeding period between mid-July to August, inclusive, potential project-only disturbance and displacement impacts are assessed as follows:

870. Acoustic stimuli associated with any given piling event within the period of April to August, inclusive, and during daylight hours (from sunrise until approximately one hour before sunset, between mid-July and August, inclusive), will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within ex situ habitats within the functionally connected South Dublin Bay and River Tolka Estuary SPA (up to 0.79 individuals where the greatest extent of mobile construction activities (i.e., Alternative Alignment for the purposes of Modelling scenario) are implemented). This represents up to 1.00% of the average number of *Sterna* terns present within South Dublin Bay during diurnal baseline surveys between April and August, inclusive (79.27 individuals) and 0.01% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013–2018 (7,364 individuals - see Table 3.4 in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

871. Visual stimuli associated with intertidal cable route installation activities within this period, will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within ex situ habitats within the functionally connected South Dublin Bay and River Tolka Estuary SPA (up to 7.47 individuals for the most impactful cable laying route selection). This represents a up to 9.42% of the average number of *Sterna* terns present within South Dublin Bay during diurnal baseline surveys between April and August, inclusive (79.27 individuals) and 0.10% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013–2018 (7,364 individuals - see Table 3.4 in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

872. With the implementation of mitigation as outlined above, given the very limited number of individuals potentially experiencing disturbance in relation to construction phase activities within ex situ intertidal areas of the functionally connected South Dublin and River Tolka Estuary SPA, there is no potential for AESI to result from such activities to the common tern SCI of Dalkey Islands SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-17**.

Project-only effect on site integrity conclusion for impact

873. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-17**. With regards to disturbance and displacement impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Construction phase impact 3 – Changes in prey availability

Array site

Project-only assessment

874. As the array site does not overlap this SPA and the SPA is beyond the range in which prey species may experience potential impacts from construction phase works, potential changes in prey availability impacts will occur entirely outside of the SPA, i.e. all impacts assessed here relate to prey species within ex situ habitats which may support this SPA SCI.

875. Common tern depredates a range of fish species, including gadoids, sandeels and clupeids. Of its key prey species groups, gadoids and clupeids are anticipated to be most impacted by underwater noise during the construction phase. Construction phase activities within the array site which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

876. These Conservation Objective attributes have the potential to be impacted through underwater noise injury, mortality or TTTS impacts on prey species, primarily during piling operations, they may also be impacted by increased suspended sediment impacts to seabird prey species, primarily from dredging and trenching.

877. Injury or mortality for prey species may occur for individuals occurring very close to high noise level construction activities (primarily piling operations); however, such effects will be localised and will be minimised by 'soft start' procedures allowing mobile prey individuals to vacate very high noise level areas, prior to noise levels resulting in injury or mortality being reached. TTS impacts may result from exposure of prey species to lower underwater noise levels and consequently are experienced over a larger area than direct injury / mortality impacts.

878. Mortality or injury-inducing underwater noise impacts to these prey species groups (primarily in relation to pile driving for WTG and OSS foundation installation over up to 262.5 days, over a period of up to 3 years) are calculated to occur within only very low proportions of theoretical common tern breeding season foraging areas around any given colony: less than 2.99% (mortality) and 8.27% (injury) of foraging areas estimated to be impacted for colonies within foraging range of the Array site (mean-maximum + 1. S.D. = 26.9 km, Woodward et al., 2019).

879. TTS impacts to prey species are considered to be very temporary in nature, and as such will have very limited potential to result in population-level consequences to their seabird predators.

880. The spatial extent of temporarily disturbed areas of benthic habitat during construction phase activities are also assessed to be of negligible size in relation to seabird breeding and non-breeding season range extents. For example, the maximum potential extent of removed or altered benthic habitat within the array site is 6.30 km^2, which equates to 0.55% of foraging areas available to colonies within foraging range of the array site (mean-maximum + 1. S.D. = 26.9 km, Woodward et al., 2019).

881. It is expected that prey species likely to occur in the vicinity of construction activities within the array site will be largely unaffected by resultant low-level temporary increases in suspended sediment concentration, as the concentrations are likely to be within the range of natural variability tolerated by these species and will reduce to background concentrations within a very short period.

882. Consequently, there is assessed to be no potential for AESI to result from changes in prey availability during construction phase activities within the array site in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-17**.

Proposed mitigation

883. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

884. As per project-only assessment, above.

OECC

Project-only assessment

885. Common tern depredates a range of fish species, including gadoids, sandeels and clupeids. Of its key prey species groups, gadoids and clupeids are anticipated to be most impacted by underwater noise during the construction phase. Construction phase activities within the OECC which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

886. These Conservation Objective attributes have the potential to be impacted through increased suspended sediment impacts to seabird prey species, primarily from dredging and trenching.

887. Underwater noise impacts to prey species are anticipated to very limited, as no pile driving activities are proposed in relation to the installation of the export cable within OECC, with high-energy underwater noise sources limited to the potential treatment of a small number of UXO (fewer than ten).

888. The spatial extent of temporarily disturbed areas of ex situ benthic habitat during construction phase activities within the OECC (up to 5.63 km^2) is also assessed to be of negligible size in relation to this SCI's breeding and non-breeding season range extents. Within these areas, benthic communities are typically resilient to localised habitat disturbance, demonstrating high or very high levels of recoverability (i.e., within weeks or months).

889. It is expected that prey species likely to occur in the vicinity of construction activities within the array site will be largely unaffected by resultant low-level temporary increases in suspended sediment concentration, as the concentrations are likely to be within the range of natural variability tolerated by these species and will reduce to background concentrations within a very short period.

890. Consequently, there is assessed to be no potential for AESI to result from changes in prey availability during construction phase activities within the OECC in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-17**.

Proposed mitigation

891. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

892. As per project-only assessment, above.

OECC intertidal landfall

Project-only assessment

893. Given the proximity of Dalkey Islands SPA to South Dublin Bay, common tern which utilise habitats within Dalkey Islands SPA, are also likely over the course of the post-breeding period, in which they typically occupy the Dublin Bay area in greatest numbers, to use intertidal areas within South Dublin Bay and, as such may experience ex situ changes in prey availability impacts from construction phase activities within this area.

894. Common tern depredates a range of fish species, including gadoids, sandeels and clupeids. Of its key prey species groups, gadoids and clupeids are anticipated to be most impacted by underwater noise during the construction phase. Construction phase activities within the OECC intertidal landfall area which may result in ex situ effects upon those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

895. These Conservation Objective attributes have the potential to be impacted through a reduction in prey availability due to:

a. Increased suspended sediment levels may temporarily alter the distribution of fish and mobile invertebrate species should they respond to avoid areas of altered water column condition.

b. Alteration of ex situ habitats which support prey species may reduce the capacity of those habitats to hold or produce prey species, thereby reducing the abundance of prey available to foraging seabirds within and around impacted areas.

896. The extent of intertidal areas (between MLWS and MHWS) within South Dublin Bay is approximately 21.94 km^2, within which approximately 0.16 km^2 (0.72%) are predicted to be disturbed during landfall cable installation (**Chapter 4: Project Description**; **Section 4.8**). As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during construction activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

897. It is therefore considered that there is no potential for AESI to result from ex situ changes in prey availability during construction phase activities within the OECC intertidal landfall area in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-17**.

Proposed mitigation

898. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

899. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

900. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-17**. With regards to changes in prey availability during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and Maintenance Phase Impacts

Operation and maintenance phase impact 1 – Direct effects on habitat

Array site

Project-only assessment

901. With regards to the array site, relevant operation and maintenance phase direct effects on habitat relate to the occupation of sea surface areas by the footprint of operational infrastructure and therefore become unavailable for use by seabird SCIs to undertake non-foraging behaviours. As the array site does not overlap this SPA, all direct effects on habitat will occur entirely outside of the SPA, i.e., all direct effects assessed here relate to ex situ habitats which may support the common tern SCI of Dalkey Islands SPA.

902. As the operation and maintenance phase progresses through its planned duration of 25 years, the above sea level spatial extent of infrastructure will at no point exceed 0.005 km^2 within the array site (i.e., combined sea level area of all WTGs and OSSs). This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for the common tern SCI of Dalkey Islands SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

903. In relation to these Conservation Objective attributes, operation and maintenance phase activities within the array site may reduce the marine areas in which individuals can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of the spatial footprint of operational infrastructure within the array site may affect the energetic costs of non-foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

904. Despite the above potential pathways to impact, these direct effects on habitat do not affect any area of the SPA (and hence do not affect the distribution of foraging, roosting or breeding habitat of this SCI within the SPA). Further, the area of habitat loss represents a negligible proportion of sea area within the foraging range (mean-maximum + 1. S.D. = 26.9 km, Woodward et al., 2019) of common tern breeding within Dalkey Islands SPA and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

905. In the context of the extent of available habitat within foraging range of the SPA, and the negligible proportion that will be occupied by operational infrastructure, the scale of direct effects on habitat within the array site is considered to be negligible. In particular, the reduction in marine areas in which to undertake non-foraging behaviours, or requirement to use alternative areas for non-foraging behaviours, is not expected to give rise to energetic costs of non-foraging behaviours in such a way as to affect the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the breeding population abundance of this SPA SCI.

906. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of common tern in the Dalkey Islands SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the SPA.

Proposed mitigation

907. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

908. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

909. Given the proximity of Dalkey Islands SPA to South Dublin Bay, common tern which utilise habitats within Dalkey Islands SPA, are also likely over the course of the post-breeding periods in which they typically occupy the Dublin Bay area in greatest numbers, to use intertidal areas within South Dublin Bay and, as such may experience direct effects on habitat from operation and maintenance phase activities within this area.

910. Impacts considered to be direct effects on habitat may arise as a consequence of maintenance activities which temporarily remove or alter areas of intertidal habitat which are utilised by this SCI in ex situ areas of South Dublin Bay. Cable landfall duct maintenance activities and potential cable repair works during the operation and maintenance phase within South Dublin Bay have the potential to alter areas of intertidal habitat such that they become temporarily unavailable to common tern connected with Dalkey Islands SPA, which may otherwise utilise those areas for ex situ non-foraging behaviours.

911. The non-foraging capacity in which the common tern SCI is considered primarily to use the intertidal habitat within South Dublin Bay is for roosting aggregations, especially during the post-breeding period (mid-July to early September).

912. Direct effects on intertidal habitat have the potential to impact on the following Conservation Objective attributes and targets for the common tern SCI of Dalkey Islands SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

913. In relation to these Conservation Objective attributes, operation and maintenance of the CWP Project OECC intertidal landfall may result in temporary reductions in the spatial extent of the ex situ intertidal areas within South Dublin Bay in which individuals from Dalkey Islands SPA can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of operation and maintenance phase activities within the OECC intertidal landfall may directly affect demographic parameters (for example, use of alternative roosting areas may increase vulnerability to predation and reduce survival rates), or may affect the energetic costs of non-foraging behaviours through increased occupancy of sub-optimal area and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

914. Despite the above potential pathways to impact, as the spatial extent of any ex situ temporary direct effects on intertidal habitats from maintenance activities will be, at most extremely localised, should extraction and reinstatement of intertidal areas be required, the level of impact is not considered capable of altering the extent of available ex situ habitat in such a way as to result in a significant decline in the population of this SCI of Dalkey Islands SPA. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation conditions of the common tern SCI of Dalkey Islands SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to Dalkey Islands SPA.

Proposed mitigation

915. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

916. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

917. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-17**. With regards to direct effects to habitat during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance phase impact 2 – Disturbance and displacement

OECC (Intertidal landfall)

Project-only assessment

918. Given the proximity of Dalkey Islands SPA to South Dublin Bay, common tern which utilise habitats within Dalkey Islands SPA, are also likely over the course of the post-breeding periods in which they typically occupy the Dublin Bay area in greatest numbers, to use intertidal areas within South Dublin Bay and, as such may experience ex situ disturbance and displacement impacts from operation and maintenance phase activities within this area.

919. Disturbance and displacement have the potential to impact on the following Conservation Objective attributes and targets for the common tern SCI of Dalkey Islands SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

920. Following installation of the OECC through the intertidal zone from the transition zone to the TJBs at the landfall location, the operational nature of any buried infrastructure within South Dublin Bay is passive. Any routine visual inspection of the OECC does not extend to buried infrastructure within South Dublin Bay.

921. It is possible that unplanned maintenance may be required on buried infrastructure within the SPA during the operational phase of the project. In relation to these Conservation Objective attributes, any such unplanned maintenance activities have the potential to cause disturbance and displacement to common tern within the vicinity of the impacted area. It is considered, however, that any unplanned maintenance activities on buried infrastructure within South Dublin Bay during the operational phase of the project would be restricted in terms of their frequency, temporal duration and spatial scale, resulting in discrete areas of a visual disturbance of ~250m radius.

922. Given the extent of intertidal habitat available to the SCI, the short temporal duration of any unplanned maintenance activities and the passive nature of the operation of buried infrastructure within the functionally connected South Dublin Bay and River Tolka Estuary SPA, it is considered such that there is no potential for AESI to the common tern SCI of Dalkey Islands SPA as a result of disturbance and displacement impacts during the operation and maintenance phase around the OECC intertidal landfall in relation to the Conservation Objectives, attributes and targets outlined in **Table 2-17**.

Proposed mitigation

923. No specific mitigation is proposed, or required, in respect of disturbance and displacement during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

924. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

925. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-17**. With regards to disturbance and displacement during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance phase impact 3 – Changes in prey availability

Array site

Project-only assessment

926. As the array site does not overlap this SPA and the SPA is beyond the range in which prey species may experience potential impacts from operation and maintenance phase works, potential changes in prey availability impacts will occur entirely outside of the SPA, i.e., all impacts assessed here relate to prey species within ex situ habitats which may support this SPA SCI.

927. Common tern depredates a range of fish species, including gadoids, sandeels and clupeids. Of its key prey species groups, gadoids and clupeids are anticipated to be most impacted by underwater noise. Operation and maintenance phase activities within the array site which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

928. In relation to these Conservation Objective attributes, maintenance activities during the operational phase of the CWP Project array site may impact common tern prey species through underwater noise effects, increases to suspended sediment concentrations, removal or alteration of important benthic habitats for those prey species, or electromagnetic field effects affecting prey species distributions around electrical infrastructure. Should these impacts to prey species reduce the availability of those prey species to foraging common terns, this may result in effects to the demographic parameters, and resultant population dynamics, of this SCI through processes such as increased energetic consequences of foraging reducing individual condition and survival or productivity rates, or reduced provisioning rates to offspring reducing productivity rates. These potential consequences may compromise the ability of the SCI to maintain its population, with prey availability changes potentially resulting in there being insufficient habitat to support the SCI's population on a long-term basis.

929. As operational phase activities within the array site will not include piling works or any other very high energy underwater noise inducing activities, and operational noise impact magnitudes to all potential prey species are assessed to be very low, there is not considered to be a pathway for operation and maintenance phase underwater noise impacts to have the potential to cause perceptible changes to prey availability in such a way that could impact this SCI.

930. Similarly, as operational phase activities within the array site do not routinely require disturbance of the seabed (in the form of trenching or dredging activities) except within localised areas in which this is necessary to facilitate repairs, increased SSC levels, are considered to occur only potentially infrequently and locally during the operational phase and there is no perceptible pathway for this impact to have the potential to cause changes to prey availability during the operational phase in such a way that could impact this SCI.

931. Key fish species, upon which common tern predate, may experience the loss of up to 0.49 km^2 of previously available benthic habitat within the array site as a result of occupancy of the seabed by infrastructure during the operation and maintenance phase of the CWP Project. The spatial extent of such prey species habitat loss is, however, considered to be of negligible size in relation to this SCI's breeding and non-breeding season range extents.

932. During the operation and maintenance phase, one additional potential impact to seabird receptor prey species which does not occur during the construction phase is considered, namely EMF effects, associated with electricity passing along infrastructure cables. Any effects on fish are anticipated to occur within the immediate vicinity of the cable and effect levels are likely to be low in relation to background levels associated with the Earth's magnetic field. The magnitude of such impacts to potentially sensitive fish species are assessed as being very low. Consequently, there is not considered to be a pathway for operation and maintenance phase EMF impacts to have the potential to cause impacts to prey availability in such a way that could impact this SCI.

933. Despite the above potential pathway to impact in the form of benthic habitat loss, the area in which impacts to prey species availability may occur represents a negligible proportion of sea area within the foraging range of common tern breeding within the Dalkey Islands SPA (mean-maximum + 1. S.D. = 26.9 km, Woodward et al., 2019) and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

934. In the context of the extent of available habitat within foraging range of the SPA, the negligible proportion of that habitat in which potential impacts to prey species may occur, and that potential impacts to prey species may be of limited (if any) demographic consequence to their seabird predators, the scale of changes in prey availability impacts associated with operation and maintenance phase activities within the array site is considered to be negligible.

935. In particular, potential changes to prey availability resultant from operation and maintenance phase activities within the array site are not expected to perceptibly increase the energetic costs of foraging, or lead to reductions in offspring provisioning rates for the common tern SCI of Dalkey Islands SPA in such a way as to affect demographic parameters. Accordingly, the level of impact is not considered capable of altering the availability of prey species in such a way as to result in a significant decline in the breeding population abundance of this SPA SCI.

936. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of this SPA SCI. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA.

Proposed mitigation

937. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

938. As per project-only assessment, above.

OECC

Project-only assessment

939. Common tern depredates a range of fish species, including gadoids, sandeels and clupeids. Of its key prey species groups, gadoids and clupeids are anticipated to be most impacted by underwater noise. Operation and maintenance phase activities within the OECC which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

940. In relation to these Conservation Objective attributes, maintenance activities during the operational phase of the OECC may impact common tern prey species through underwater noise effects, increases to suspended sediment concentrations, removal or alteration of important benthic habitats for those prey species, or electromagnetic field effects affecting prey species distributions around electrical infrastructure. Should these impacts to prey species reduce the availability of those prey species to foraging common tern, this may result in effects to the demographic parameters, and resultant population dynamics, of this SCI through processes such as increased energetic consequences of foraging reducing individual condition and survival or productivity rates, or reduced provisioning rates to offspring reducing productivity rates. These potential consequences may compromise the ability of the SCI to maintain its population, with prey availability changes potentially resulting in there being insufficient habitat to support the SCI's population on a long-term basis.

941. As operational phase activities within the OECC will not include piling works or any other very high energy underwater noise inducing activities, and operational noise impact magnitudes to all potential prey species are assessed to be very low, there is not considered to be a pathway for operation and maintenance phase underwater noise impacts to have the potential to cause perceptible changes to prey availability in such a way that could impact this SCI.

942. Similarly, as operational phase activities within the OECC do not routinely require disturbance of the seabed (in the form of trenching or dredging activities) except within localised areas in which this is necessary to facilitate repairs, increased SSC levels, are considered to occur only potentially infrequently and locally during the operational phase and there is no perceptible pathway for this impact to have the potential to cause changes to prey availability during the operational phase in such a way that could impact this SCI.

943. Key fish species, upon which common tern depredate, may experience the loss of up 0.11 km^2 of previously available benthic habitat within the OECC as a result of alteration of the seabed during the operation and maintenance phase of the Project. The areas which may experience long-term alteration of any benthic habitats which have the potential to support populations of key seabird prey species constitute only a very small proportion (<1%) of the extent of common tern foraging areas.

944. During the operation and maintenance phase, one additional potential impact to seabird receptor prey species which does not occur during the construction phase is considered, namely EMF effects, associated with electricity passing along infrastructure cables. Any effects on fish are anticipated to occur within the immediate vicinity of the cable and effect levels are likely to be low in relation to background levels associated with the Earth's magnetic field. The magnitude of such impacts to potentially sensitive fish species are assessed as being very low. Consequently, there is not considered to be a pathway for operation and maintenance phase EMF impacts to have the potential to cause impacts to prey availability in such a way that could impact this SCI.

945. Despite the above potential pathway to impact in the form of benthic habitat loss, the area in which impacts to prey species availability may occur represents a negligible proportion of sea area within the foraging range of common tern breeding within this SPA (mean-maximum + 1. S.D. = 26.9 km, Woodward et al., 2019) and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

946. In the context of the extent of available habitat within foraging range of the SPA, the negligible proportion of that habitat in which potential impacts to prey species may occur, and that potential impacts to prey species may be of limited (if any) demographic consequence to their seabird predators, the scale of changes in prey availability impacts associated with operation and maintenance phase activities within the array site is considered to be negligible.

947. In particular, potential changes to prey availability resultant from operation and maintenance phase activities within the array site are not expected to perceptibly increase the energetic costs of foraging, or lead to reductions in offspring provisioning rates for this SPA SCI in such a way as to affect demographic parameters. Accordingly, the level of impact is not considered capable of altering the availability of common tern prey species in such a way as to result in a significant decline in the breeding population abundance of this SPA SCI.

948. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of this SPA SCI. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA.

Proposed mitigation

949. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

950. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

951. Given the proximity of Dalkey Islands SPA to South Dublin Bay, common tern which utilise habitats within Dalkey Islands SPA are also likely to use intertidal areas within South Dublin Bay over the course of the post-breeding periods in which they typically occupy the Dublin Bay area in greatest numbers. As such, they may experience changes in prey availability impacts from operation and maintenance phase activities within this area.

952. Common tern depredates a range of fish species, including gadoids, sandeels and clupeids. Of its key prey species groups, gadoids and clupeids are anticipated to be most impacted by underwater noise during the operation and maintenance phase. Operation and maintenance phase activities within the OECC intertidal landfall area which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

953. Following installation of the OECC through the intertidal zone from the transition zone to the TJBs at the landfall location, the operational nature of any buried infrastructure within South Dublin Bay is passive. Any routine visual inspection of the OECC does not extend to buried infrastructure within the functionally connected South Dublin Bay and River Tolka Estuary SPA.

954. It is possible that unplanned maintenance may be required on buried infrastructure within South Dublin Bay during the operational phase of the project. In relation to these Conservation Objective attributes any such unplanned maintenance activities have the potential to cause disturbance and displacement to common tern within the vicinity of the impacted area. It is considered, however, that any unplanned maintenance activities on buried infrastructure within South Dublin Bay during the operational phase of the project would be restricted in terms of their frequency, temporal duration and spatial scale.

955. The extent of intertidal areas (between MLWS and MHWS) within South Dublin Bay is approximately 21.94 km^2, within which approximately 0.16 km^2 (0.72%) are predicted to be disturbed during landfall cable installation (**Chapter 4: Project Description**; **Section 4.8**). The scale of any maintenance to buried infrastructure carried out during the operation and maintenance phase will likely be considerably smaller than that during cable installation during the construction phase. As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during operation and maintenance activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

956. It is therefore considered that there is no potential for AESI to result from changes in prey availability during operation and maintenance phase activities within the OECC intertidal landfall area in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-17**.

Proposed mitigation

957. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

958. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

959. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-17**. With regards to changes in prey availability during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance impact 4 – Collision

Array site

Project-only assessment

960. During the operation and maintenance phase of the CWP Project the presence of operational WTGs within the array site may result in the mortality of this SPA SCI through the collision of individuals with turbine blades. Collision mortality has the potential to impact on the following Conservation Objective attribute and target for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats.

961. In relation to these Conservation Objective attributes, mortality resultant from collision with operational WTGs within the array site may directly affect the overall survival rate of this SPA SCI that could then impact population sizes. Furthermore, collision mortality may also adversely affect the overall productivity rate of this SPA SCI, through reductions to offspring provisioning rates and other parental care metrics.

962. Common tern which breed within the SPA (30 individuals – 2017 count, SMP) and common tern which use the functionally connected South Dublin Bay and River Tolka Estuary SPA during the post-breeding period (a maximum count of 17,440 *Sterna* terns in attendance at post-breeding tern roost in South Dublin Bay in 2016 (Tierney et al., 2016; Burke and Crowe, 2016) is the largest aggregation recorded using the SPA – the majority of which are likely to have been common tern), may, however, potentially collide with turbines during their return and post-breeding migrations. On this basis, potential collision impacts to the common tern breeding population of the SCI are assessed in **Table 2-18** and potential collision impacts to the common tern post-breeding aggregation population of the SCI are assessed in **Table 2-19**. In the latter case, the conservative assumption is made that all of the maximum count of 17,440 *Sterna* terns in attendance at post-breeding tern roost in South Dublin Bay in 2016 were common tern, resulting in a maximum proportion of total collision risk being apportioned to the SPA.

963. Total bio-seasonal and total annual estimated common tern collision mortalities, as derived in **Technical Appendix 10.3: Collision Risk Modelling** of the EIAR, are presented in **Table 2-18** and **Table 2-19**. In **Table 2-18**, these values are apportioned to Dalkey Islands SPA according to the apportioning ratios determined in **Appendix 3: Apportioning Impacts to SPAs** in Volume 7 of this NIS, on the basis of the breeding colony size of the SPA and common tern collision mortalities apportioned to the SPA in each bio-season and annually. In **Table 2-19**, these values are apportioned to Dalkey Islands SPA on the basis of the maximum post-breeding aggregation size of the SPA and common tern collision mortalities apportioned to the SPA in each bio-season and annually.

964. Collision mortalities are presented in relation to Design Options A and B and Collision Risk Modelling (CRM) Band Option 2 models.

Table 2-18: Total bio-seasonal and annual collision mortalities to common tern and mortalities apportioned to Dalkey Islands SPA in relation to SPA breeding population

	Design option	CRM Band Option	Bio-season			Annual
			RM (Apr–May)	MFB (Jun)	PBM (Jul–Sep)	
Total impact	A	2	0.147	0.019	2.107	2.273

	B	2	0.129	0.017	1.887	2.033
Proportion of impact apportioned to SPA (in relation to SPA breeding population of 30 individuals)			0.04%	58.80%	0.04%	
Impact to SPA	A	2	0.000	0.011	0.001	0.012
	B	2	0.000	0.010	0.001	0.011

Table 2-19: Total bio- seasonal and annual collision mortalities to common tern and mortalities apportioned to Dalkey Islands SPA in relation to maximum South Dublin Bay post breeding *Sterna* tern aggregation size

	Design option	CRM Band Option	Bio-season			Annual
			RM (Apr–May)	MFB (Jun)	PBM (Jul–Sep)	
Total Impact	A	2	0.147	0.019	2.107	2.273
	B	2	0.129	0.017	1.887	2.033
Proportion of impact apportioned to SPA (in relation to South Dublin Bay post-breeding aggregation population of 17,440 individuals)			23.57%	58.80%	23.57%	
Impact to SPA	A	2	0.035	0.011	0.497	0.543
	B	2	0.030	0.010	0.445	0.485

965. Increases to SPA breeding common tern mortality rates resultant from apportioned annual impacts are presented in **Table 2-20**. In this table, the most recent colony count from the SPA (2017 count - SMP, 2023), is used to estimate the average number of breeding adults from the SPA colony which die each year by multiplying by one minus common tern adult annual survival rate taken from Horswill and Robinson (2015), and apportioned mortality compared to this figure to determine the proportional increase to SPA mortality rates presented by additional collision mortality associated with the CWP Project.

966. Increases to SPA post-breeding aggregation common tern mortality rates resultant from apportioned annual impacts are presented in **Table 2-21**. In this table the maximum post-breeding aggregation count (assumed to all be common tern for apportioning purposes) of 17,440 *Sterna* terns in attendance at the post-breeding tern roost in South Dublin Bay (Tierney et al., 2016; Burke and Crowe, 2016) is used to estimate the average number of individuals associated with the SPA which die each year by multiplying by one minus common tern overall annual survival rate calculated from Horswill and Robinson (2015), (shown in Table 10-15, **EIA Chapter 10: Ornithology – Section 10.6.1**) and apportioned mortality compared to this figure to determine the proportional increase to SPA mortality rates presented by additional collision mortality associated with the CWP project.

Table 2-20: Increase to annual mortality rates resulting from collision mortalities apportioned to Dalkey Islands SPA in relation to SPA breeding population

Design option	CRM Band Option	Annual impact to SPA	SPA population (breeding adults)	Adult annual mortality rate	Baseline estimated SPA annual mortality	Increase to SPA mortality rate
A	2	0.012	30	11.70%	3.510	0.344%
B	2	0.011				0.308%

Table 2-21: Increase to annual mortality rates resulting from collision mortalities apportioned to Dalkey Islands SPA in relation to SPA post-breeding aggregation population

Design option	CRM Band Option	Annual impact to SPA	SPA population (post-breeding aggregation)	Overall annual mortality rate	Baseline estimated SPA annual mortality	Increase to SPA mortality rate
A	2	0.543	17440	11.70%	2040.480	0.027%
B	2	0.485				0.024%

967. As additional mortality to the common tern SCI of Dalkey Islands SPA resulting from collision with operational WTGs is estimated to represent only a very small potential increase (much less than 0.1%) to SPA baseline mortality rates, this impact will not result in an AESI in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-17**. Specifically, this negligible increase to baseline mortality is considered not to represent a significant decline to the breeding population abundance or passage population size of this SCI. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

968. No specific mitigation is proposed, or required, in respect of collision during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

969. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

970. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-17**. With regards to collision impacts during the operation and maintenance phase of the CWP Project,

it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

2.4.2 Receptor 2: Arctic tern

Construction Phase Impacts

Construction phase impact 1 – Direct effects on habitat

Array site

Project-only assessment

971. With regards to the array site, relevant construction phase direct effects on habitat relate to the alteration of ex situ sea-surface areas as they become occupied by the footprint of installed infrastructure and, therefore, unavailable for use by seabird SCIs to undertake non-foraging behaviours.

972. As construction of the array site progresses through its planned duration of approximately 2.5 years, the above sea level spatial extent of infrastructure will increase to a maximum of less than 0.005 km^2 within the array site (i.e., combined sea level area of all WTGs and OSSs). This ex situ direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

973. In relation to these Conservation Objective attributes, construction within the array site may reduce the ex situ marine areas in which individuals can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of construction phase activities within the array site may affect the energetic costs of non-foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

974. Despite the above potential pathways to impact, these direct effects on habitat do not affect any area of the SPA (and hence do not affect the distribution of foraging, roosting or breeding habitat of this SCI within the SPA). Further, the area of ex situ habitat loss represents a negligible proportion of sea area within the foraging range (mean-maximum + 1. S.D. = 40.5 km, Woodward et al., 2019) of Arctic tern breeding within Dalkey Islands SPA and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

975. In the context of the area of available habitat within foraging range of the SPA, and the negligible proportion that will be lost ex situ within the array site during construction, the scale of direct effects on habitat within the array site is considered to be negligible. In particular, the reduction in ex situ marine areas in which to undertake non-foraging behaviours, or requirement to use alternative areas for non-foraging behaviours, is not expected to give rise to energetic costs of non-foraging behaviours in such a way as to affect the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of resulting in a significant decline in the breeding population abundance or passage population of the Arctic tern SCI.

976. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of Arctic tern in the SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on Dalkey Islands SPA.

Proposed mitigation

977. No specific mitigation is proposed, or required, in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

978. As per project-only assessment, above.

OECC (Intertidal landfall)

979. Given the proximity of Dalkey Islands SPA to South Dublin Bay, Arctic tern, which utilise habitats within Dalkey Islands SPA, are also likely over the course post-breeding period, in which they typically occupy the Dublin Bay area in greatest numbers, to use intertidal areas within South Dublin Bay and, as such may experience ex situ direct effects on habitat from construction phase activities within this area.

Project-only assessment

980. Impacts considered to be direct effects on habitat may arise as a consequence of activities which temporarily disturb areas of ex situ intertidal habitat which are utilised by ornithological SCIs. There is no ex situ or in situ direct loss or removal of intertidal habitat proposed by the CWP project. Ex situ direct effects to intertidal areas which may be utilised by birds for non-foraging behaviours (such as roosting, loafing and maintenance) are considered only to relate to the physical footprint of the proposed intertidal infrastructure and works (i.e., the intertidal cable route during construction and any infrastructure at the proposed landfall location).

981. The non-foraging capacity in which the Arctic tern SCI is considered primarily to use the ex situ intertidal habitat within South Dublin Bay is for roosting aggregations, especially during the post-breeding period (mid-July to early September).

982. Ex situ direct effects on intertidal habitat have the potential to impact on the following Conservation Objective attributes and targets for the Arctic tern SCI of Dalkey Islands SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

983. In relation to these Conservation Objective attributes, construction in the OECC landfall area may temporarily reduce the ex situ areas in which individuals can undertake non-foraging behaviours (such as roosting) or require individuals to use alternative areas for these non-foraging behaviours. These impacts may affect energetic costs of non-foraging behaviours, which may in turn affect the condition of individuals and survival rates.

984. There will be no in situ direct effects on the Dalkey Islands SPA, the following analysis considers ex situ interactions in the South Dublin Bay and River Tolka Estuary SPA which may be utilised by this SPA SCI as a component of its broader natural range. The spatial extent of ex situ intertidal habitat

within South Dublin Bay and River Tolka Estuary SPA, which may act as supporting habitat for the tern SCIs of Dalkey Islands SPA, is 21.94 km^2. Approximately 0.16 km^2 of intertidal habitat within South Dublin Bay and River Tolka Estuary SPA is estimated to be subject to direct effects as a result of intertidal cable landfall activities (0.04 km^2 from open cut landfall cable duct installation, 0.11 km^2 from cable laying activities in the transition zone, and 0.006 km^2 as a result of the cofferdam installation). This equates to approximately 0.72% of the total ex situ intertidal habitat area within South Dublin Bay and River Tolka Estuary SPA being subject to temporary direct effects on habitat during the construction phase of the proposed intertidal landfall works.

985. Following the backfilling of any excavated sections of trenching and removal of any supporting vehicles and / or infrastructure, it is considered that the re-establishment of intertidal habitat available to birds for non-foraging activities would occur rapidly due to the dynamic nature of intertidal habitats within South Dublin Bay. Any effects on the physical habitat around active intertidal construction loci would be brief, lasting less than several tidal cycles. Intertidal mudflats are considered resilient to isolated physical disturbances and can recover well (OSPAR, 2023).

986. Despite the above potential pathways to impact, in the context of the negligible proportion of ex situ intertidal habitat which will be affected during construction and the short-term temporary nature of the effects to those habitats, the scale of direct effects on habitat within the OECC intertidal landfall area is considered to be negligible. In particular, the reduction in intertidal areas in which non-foraging behaviours are undertaken (including potential roosting areas used by Arctic tern during the post-breeding period), or requirement to use alternative areas for non-foraging behaviours, is not expected to give rise to energetic costs of non-foraging behaviours in such a way as to affect the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of resulting in a significant decline in the breeding population abundance or passage population of the arctic tern SCI.

987. Similarly, temporary negligible short-term effects on the distribution of Arctic tern ex situ roosting areas will not constitute any significant decline in relation to this Conservation Objective attribute.

988. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of Arctic tern in the functionally connected South Dublin Bay and River Tolka Estuary SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the Dalkey Islands SPA.

Proposed mitigation

989. No specific mitigation is proposed, or required, in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

990. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

991. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-17**. With regards to direct effects on habitat impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Construction phase impact 2 – Disturbance and displacement

OECC (Intertidal landfall)

Project-only assessment

992. Given the proximity of Dalkey Islands SPA to South Dublin Bay, Arctic tern which utilise habitats within Dalkey Islands SPA, are also likely to use ex situ intertidal areas within South Dublin Bay over the course post-breeding period, in which they typically occupy the Dublin Bay area in greatest numbers. As such, Arctic tern may experience ex situ disturbance and displacement from construction phase activities within this area.

993. Common tern, Arctic tern and roseate tern are three closely related and morphologically similar species. During the post-breeding period and given the low-light conditions in which these species may utilise the ex situ intertidal habitats of South Dublin Bay to form nocturnal roosting aggregations, it was generally not possible to differentiate these species during baseline surveys which were used to determine the number of individuals of these SCIs which may experience disturbance and displacement during crepuscular or nocturnal construction phase activities within the intertidal part of the OECC. Consequently, these species are considered collectively in relation to construction phase disturbance and displacement at the OECC intertidal landfall location. This means that when the impact values for *Sterna* terns are related to the population size of a particular species, the estimates of the proportions impacted are very precautionary.

994. Disturbance and displacement of terns roosting within, or otherwise using, supporting habitat within South Dublin Bay have the potential to impact on the following Conservation Objective attributes and targets for the Arctic tern SCI of Dalkey Islands SPA on an ex situ basis:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

995. In relation to these Conservation Objective attributes, construction within the OECC intertidal landfall area may temporarily reduce the ex situ areas in which individuals can undertake non-foraging behaviours (such as roosting) or require individuals to use alternative areas for these non-foraging behaviours. These impacts may affect energetic costs of such non-foraging behaviours, which may in turn affect condition of individuals and survival rates.

996. Acoustic stimuli associated with any given piling event during daylight hours, when terns are not forming nocturnal roosting aggregations within South Dublin Bay (from sunrise until approximately two hours before sunset (Tierney et al., 2016)), will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within ex situ intertidal habitat within the vicinity of the OECC intertidal landfall area (up to 0.3 individuals where the greatest extent of mobile construction activities (i.e., Alternative Alignment for the purposes of Modelling scenario) are implemented). This represents a up to 1.07% of the average number of *Sterna* terns present within ex situ intertidal habitat within the South Dublin Bay section of the South Dublin Bay and River Tolka Estuary SPA during diurnal baseline surveys (28.02 individuals), up to 0.03% of the SPA common tern breeding population (988 individuals – 2016 count, SMP 2023) and <0.01% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013–2018 (7,364 individuals - see Table 3.4 in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

997. Visual stimuli associated with intertidal cable route installation activities between sunrise and approximately two hours before sunset, will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within ex situ intertidal habitat within the vicinity of the OECC

intertidal landfall area (up to 2.88 individuals for the most impactful cable laying route selection). This represents a up to 10.26% of the average number of *Sterna* terns present within ex situ intertidal habitat within the South Dublin Bay section of the South Dublin Bay and River Tolka Estuary SPA during diurnal baseline surveys (28.02 individuals), up to 0.29% of the SPA common tern breeding population (988 individuals – 2016 count, SMP 2023) and 0.04% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013–2018 (7,364 individuals - see Table 3.4 in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

998. As such, given the very limited number of individuals potentially experiencing ex situ disturbance in relation to diurnal construction phase activities within intertidal areas of the functionally connected South Dublin and River Tolka Estuary SPA, there is no potential for AESI to result from such activities to the Arctic tern SCI of Dalkey Islands SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-17**.

999. Should, however, construction activities be undertaken during periods in which *Sterna* terns form post breeding roosting aggregations within South Dublin Bay (specifically between one hour before sunset through to sunrise, from mid-July to September, inclusive), acoustic and visual stimuli from such activities may result in potential ex situ disturbance impacts to larger numbers of *Sterna* terns within intertidal areas of South Dublin Bay, than if activities were conducted outside of these periods.

1000. Unlike during diurnal periods, for which information relating to the ecological sensitivity of Sterna terns to visual and acoustic stimuli is available, disturbance responses of nocturnal roosting terns to such stimuli are unknown. As such, in the absence of being able to overlap disturbance effect ranges with receptor distributions, to inform the assessment of potential ex situ disturbance and displacement impact magnitudes to roosting tern receptors from Dalkey Islands SPA for intertidal cable installation scenarios, the distribution of potential acoustic (piling) and visual (cable route laying) nocturnal disturbance sources are compared to roosting tern aggregation locations noted during baseline post-breeding tern aggregation surveys (**Figure 2-1** and **Figure 2-2**) and roosting tern aggregation locations which have been noted during other surveys of South Dublin Bay (**Figure 2-3** to **Figure 2-5**).

1001. This comparison of ex situ tern roosting locations and cable route infrastructure indicates that, should cable route installation activities be undertaken during periods where roosting terns occupy roost sites, whilst there is uncertainty on the magnitude of the impact, there is the potential for disturbance impacts to large or very large proportions of large or very large numbers of roosting individuals within South Dublin Bay.

1002. As such, despite the limited duration of potential ex situ acoustic and visual disturbance impacts, there is assessed to be the potential for AESI to result from such activities to the Arctic tern SCI of Dalkey Islands SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-17**.

Proposed mitigation

1003. As ex situ intertidal habitats within South Dublin Bay are primarily used by *Sterna* tern species during their post-breeding migration periods (mid-July to late September) as nocturnal roosting areas, additional mitigation in the form of daily temporal restrictions (during the mid-July to late-August period) is considered to be effective to ensure no AESI to the Arctic tern SCI of the Dalkey Islands SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-17**.

1004. It should be noted that whilst it is not possible to quantify the reduction in the ex situ impact through the implementation of this mitigation, the level of ex situ impact with the mitigation in place can be certain.

1005. Full details of this daily temporal restriction additional mitigation are as follows:

- No construction phase cable route installation or associated activities, including preparatory works, will be undertaken between one hour prior to sunset and the following sunrise within the South Dublin Bay area during the period of mid-July to August, inclusive; and
- This area corresponds with the extent of intertidal habitat (areas between mean low water springs (MLWS) and MHWS) within the South Dublin Bay part of the functionally connected South Dublin Bay and River Tolka Estuary SPA, and also includes a small area of terrestrial habitat covering the Goose Green area at Poolbeg.

Residual impacts

1006. With the daily temporary restrictions applied during the post-breeding period between mid-July to August, inclusive, potential project-only disturbance and displacement impacts are assessed as follows:

1007. Acoustic stimuli associated with any given piling event within the period of April to August, inclusive, and during daylight hours (from sunrise until approximately one hour before sunset (Tierney et al., 2016), between mid-July and August, inclusive), will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within ex situ habitats within the functionally connected South Dublin Bay and River Tolka Estuary SPA (up to 0.79 individuals where the greatest extent of mobile construction activities (i.e., Alternative Alignment for the purposes of Modelling scenario) are implemented). This represents up to 1.00% of the average number of *Sterna* terns present within South Dublin Bay during diurnal baseline surveys between April and August, inclusive (79.27 individuals) and 0.01% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013–2018 (7,364 individuals - see Table 3.4 in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

1008. Visual stimuli associated with intertidal cable route installation activities within this period, will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within ex -situ habitats within the functionally connected South Dublin Bay and River Tolka Estuary SPA (up to 7.47 individuals for the most impactful cable laying route selection). This represents up to 9.42% of the average number of *Sterna* terns present within South Dublin Bay during diurnal baseline surveys between April and August, inclusive (79.27 individuals) and 0.10% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013–2018 (7,364 individuals - see Table 3.4 in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

1009. With the implementation of mitigation as outlined above, given the very limited number of individuals potentially experiencing disturbance in relation to construction phase activities within ex situ intertidal areas of the functionally connected South Dublin and River Tolka Estuary SPA, there is no potential for AESI to result from such activities to the Arctic tern SCI of Dalkey Islands SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-17**.

Project-only effect on site integrity conclusion for impact

1010. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-17**. With regards to disturbance and displacement impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Construction phase impact 3 – Changes in prey availability

Array site

Project-only assessment

1011. As the array site does not overlap this SPA and the SPA is beyond the range in which prey species may experience potential impacts from construction phase works, potential changes in prey availability impacts will occur entirely outside of the SPA, i.e. all impacts assessed here relate to prey species within ex situ habitats which may support this SPA SCI.

1012. Arctic tern depredates a range of fish species, including sandeels and clupeids. Of its key prey species groups, clupeids are anticipated to be most impacted by underwater noise during the construction phase. Construction phase activities within the array site which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1013. These Conservation Objective attributes have the potential to be impacted through underwater noise injury, mortality or TTS impacts on prey species, primarily during piling operations, they may also be impacted by Increased suspended sediment impacts to seabird prey species, primarily from dredging and trenching.

1014. Injury or mortality for prey species may occur for individuals occurring very close to high noise level construction activities (primarily piling operations); however, such effects will be localised and will be minimised by 'soft start' procedures allowing mobile prey individuals to vacate very high noise level areas, prior to noise levels resulting in injury or mortality being reached. TTS impacts may result from exposure of prey species to lower underwater noise levels and consequently are experienced over a larger area than direct injury/mortality impacts.

1015. Mortality or injury-inducing underwater noise impacts to these prey species groups (primarily in relation to pile driving for WTG and OSS foundation installation over up to 262.5 days, over a period of up to 3 years) are calculated to occur within only very low proportions of theoretical Arctic tern breeding season foraging areas around any given colony: <1.32% (mortality) and 3.65% (injury) of foraging areas estimated to be impacted for colonies within foraging range of the array site (mean-maximum + 1. S.D. = 40.5 km, Woodward et al., 2019).

1016. TTS impacts on prey species are considered to be very temporary in nature, and as such will have very limited potential to result in population-level consequences to their seabird predators.

1017. The spatial extent of temporarily disturbed areas of benthic habitat during construction phase activities are also assessed to be of negligible size in relation to seabird breeding and non-breeding season range extents. For example, the maximum potential extent of removed or altered benthic habitat within the array site is 6.30 km^2, which equates to 0.24% of foraging areas available to colonies within foraging range of the array site (mean-maximum + 1. S.D. = 40.5 km, Woodward et al., 2019).

1018. It is expected that prey species likely to occur in the vicinity of construction activities within the array site will be largely unaffected by resultant low-level temporary increases in suspended sediment concentration, as the concentrations are likely to be within the range of natural variability tolerated by these species and will reduce to background concentrations within a very short period.

1019. Consequently, there is assessed to be no potential for AESI to result from changes in prey availability during construction phase activities within the array site in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-17**.

Proposed mitigation

1020. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1021. As per project-only assessment, above.

OECC

Project-only assessment

1022. Arctic tern depredates a range of fish species, including sandeels and clupeids. Of its key prey species groups, clupeids are anticipated to be most impacted by underwater noise during the construction phase. Construction phase activities within the array site which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1023. These Conservation Objective attributes have the potential to be impacted through increased suspended sediment impacts to seabird prey species, primarily from dredging and trenching.

1024. Underwater noise impacts on prey species are anticipated to very limited, as no pile driving activities are proposed in relation to the installation of the export cable within OECC, with high energy underwater noise sources limited to the potential treatment of a small number of UXO (fewer than ten).

1025. The spatial extent of temporarily disturbed areas of ex situ benthic habitat during construction phase activities within the OECC (up to 5.63 km^2) is also assessed to be of negligible size in relation to this SCI's breeding and non-breeding season range extents. Within these areas, benthic communities are typically resilient to localised habitat disturbance, demonstrating high or very high levels of recoverability (i.e., within weeks or months).

1026. It is expected that prey species likely to occur in the vicinity of construction activities within the OECC will be largely unaffected by resultant low-level temporary increases in suspended sediment concentration, as the concentrations are likely to be within the range of natural variability tolerated by these species and will reduce to background concentrations within a very short period.

1027. Consequently, there is assessed to be no potential for AESI to result from changes in prey availability during construction phase activities within the OECC in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-17**.

Proposed mitigation

1028. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1029. As per project-only assessment, above.

OECC Intertidal landfall

Project-only assessment

1030. Given the proximity of Dalkey Islands SPA to South Dublin Bay, Arctic tern which utilise habitats within Dalkey Islands SPA, are also likely over the course of the post-breeding period, in which they typically occupy the Dublin Bay area in greatest numbers, to use intertidal areas within South Dublin Bay and, as such may experience ex situ changes in prey availability impacts from construction phase activities within this area.

1031. Arctic tern depredates a range of fish species, including sandeels and clupeids. Of its key prey species groups, clupeids are anticipated to be most impacted by underwater noise during the construction phase. Construction phase activities within the OECC intertidal landfall area which may result in ex situ effects upon those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1032. These Conservation Objective attributes have the potential to be impacted through a reduction in prey availability due to:

a. Increased suspended sediment levels may temporarily alter the distribution of fish and mobile invertebrate species should they respond to avoid areas of altered water column condition.

b. Alteration of ex situ habitats which support prey species may reduce the capacity of those habitats to hold or produce prey species, thereby reducing the abundance of prey available to foraging seabirds within and around impacted areas.

1033. The extent of intertidal areas (between MLWS and MHWS) within South Dublin Bay is approximately 21.94 km^2, within which approximately 0.16 km^2 (0.72%) are predicted to be disturbed during landfall cable installation (**Chapter 4: Project Description**; **Section 4.8**). As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during construction activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

1034. It is therefore considered that there is no potential for AESI to result from ex situ changes in prey availability during construction phase activities within the OECC intertidal landfall area in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-17**.

Proposed mitigation

1035. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1036. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1037. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-17**. With regards to changes in prey availability during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and Maintenance Phase Impacts

Operation and maintenance phase impact 1 – Direct effects on habitat

Array site

Project-only assessment

1038. With regards to the array site, relevant operation and maintenance phase direct effects on habitat relate to the occupation of sea surface areas by the footprint of operational infrastructure and therefore become unavailable for use by seabird SCIs to undertake non-foraging behaviours. As the array site does not overlap this SPA, all direct effects on habitat will occur entirely outside of the SPA, i.e. all direct effects assessed here relate to ex situ habitats which may support the Arctic tern SCI of Dalkey Islands SPA.

1039. As the operation and maintenance phase progresses through its planned duration of 25 years, the above sea level spatial extent of infrastructure will at no point exceed 0.005 km^2 within the array site (i.e., combined sea level area of all WTGs and OSSs). This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for the Arctic tern SCI of Dalkey Islands SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1040. In relation to these Conservation Objective attributes, the presence of built infrastructure following the removal of previously available habitat may reduce the marine areas in which individuals can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of the spatial footprint of operational infrastructure within the array site may affect the energetic costs of non-foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

1041. Despite the above potential pathways to impact, these direct effects on habitat do not affect any area of the SPA (and hence do not affect the distribution of foraging, roosting or breeding habitat of this SCI within the SPA). Further, the area of habitat loss represents a negligible proportion of sea area within the foraging range (mean-maximum + 1. S.D. = 40.5 km, Woodward et al., 2019) of Arctic tern breeding within Dalkey Islands SPA and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

1042. In the context of the extent of available habitat within foraging range of the SPA, and the negligible proportion that will be occupied by operational infrastructure, the scale of direct effects on habitat within the array site is considered to be negligible. In particular, the reduction in marine areas in which to undertake non-foraging behaviours, or requirement to use alternative areas for non-foraging behaviours, is not expected to give rise to energetic costs of non-foraging behaviours in such a way as to affect the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the breeding population abundance of this SPA SCI.

1043. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of Arctic tern in the Dalkey Islands SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the SPA.

Proposed mitigation

1044. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1045. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

1046. Given the proximity of Dalkey Islands SPA to South Dublin Bay, Arctic tern which utilise habitats within Dalkey Islands SPA, are also likely over the course of the post-breeding periods in which they typically occupy the Dublin Bay area in greatest numbers, to use intertidal areas within South Dublin Bay and, as such may experience direct effects on habitat from operation and maintenance phase activities within this area.

1047. Impacts considered to be direct effects on habitat may arise as a consequence of maintenance activities which temporarily remove or alter areas of intertidal habitat which are utilised by this SCI in ex situ areas of South Dublin Bay. Cable landfall duct maintenance activities and potential cable repair works during the operation and maintenance phase within South Dublin Bay have the potential to alter areas of intertidal habitat such that they become temporarily unavailable to Arctic tern connected with Dalkey Islands SPA, which may otherwise utilise those areas for ex situ non-foraging behaviours.

1048. The non-foraging capacity in which the Arctic tern SCI is considered primarily to use the intertidal habitat within South Dublin Bay is for roosting aggregations, especially during the post-breeding period (mid-July to early September).

1049. Direct effects on intertidal habitat have the potential to impact on the following Conservation Objective attributes and targets for the Arctic tern SCI of Dalkey Islands SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1050. In relation to these Conservation Objective attributes, operation and maintenance of the CWP Project OECC intertidal landfall may result in temporary reductions in the spatial extent of the ex situ intertidal areas within South Dublin Bay in which individuals from Dalkey Islands SPA can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of operation and maintenance phase activities within the OECC intertidal landfall may directly affect demographic parameters (for example, use of alternative roosting areas may increase vulnerability to predation and reduce survival rates), or may affect the energetic costs of non-foraging behaviours through increased occupancy of sub-optimal area and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

1051. Despite the above potential pathways to impact, as the spatial extent of any ex situ temporary direct effects on intertidal habitats from maintenance activities will be, at most extremely localised, should extraction and reinstatement of intertidal areas be required, the level of impact is not considered capable of altering the extent of available ex situ habitat in such a way as to result in a significant decline in the population of this SCI of Dalkey Islands SPA. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation conditions of the Arctic tern SCI of Dalkey Islands SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to Dalkey Islands SPA.

Proposed mitigation

1052. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1053. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1054. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-17**. With regards to direct effects to habitat during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance phase impact 2 – Disturbance and displacement

OECC (Intertidal landfall)

Project-only assessment

1055. Given the proximity of Dalkey Islands SPA to South Dublin Bay, Arctic tern which utilise habitats within Dalkey Islands SPA are also likely to use intertidal areas within South Dublin Bay over the course of the post-breeding periods in which they typically occupy the Dublin Bay area in greatest numbers. As such, Arctic tern may experience ex situ disturbance and displacement impacts from operation and maintenance phase activities within this area.

1056. Disturbance and displacement have the potential to impact on the following Conservation Objective attributes and targets for the Arctic tern SCI of Dalkey Islands SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1057. Following installation of the OECC through the intertidal zone from the transition zone to the TJBs at the landfall location, the operational nature of any buried infrastructure within South Dublin Bay is passive. Any routine visual inspection of the OECC does not extend to buried infrastructure within South Dublin Bay.

1058. It is possible that unplanned maintenance may be required on buried infrastructure within the SPA during the operational phase of the project. In relation to these Conservation Objective attributes, any such unplanned maintenance activities have the potential to cause disturbance and displacement to Arctic tern within the vicinity of the impacted area. It is considered, however, that any unplanned maintenance activities on buried infrastructure within South Dublin Bay during the operational phase of the project would be restricted in terms of their frequency, temporal duration and spatial scale, resulting in discrete areas of a visual disturbance of ~250m radius.

1059. Given the extent of intertidal habitat available to the SCI, the short temporal duration of any unplanned maintenance activities and the passive nature of the operation of buried infrastructure within the functionally connected South Dublin Bay and River Tolka Estuary SPA, it is considered such that there is no potential for AESI to the Arctic tern SCI of Dalkey Islands SPA as a result of disturbance and displacement impacts during the operation and maintenance phase around the OECC intertidal landfall in relation to the Conservation Objectives, attributes and targets outlined in **Table 2-17**.

Proposed mitigation

1060. No specific mitigation is proposed, or required, in respect of disturbance and displacement during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1061. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1062. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-17**. With regards to disturbance and displacement during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance phase impact 3 – Changes in prey availability

Array site

Project-only assessment

1063. As the array site does not overlap this SPA and the SPA is beyond the range in which prey species may experience potential impacts from operation and maintenance phase works, potential changes in prey availability impacts will occur entirely outside of the SPA, i.e., all impacts assessed here relate to prey species within ex situ habitats which may support this SPA SCI.

1064. Arctic tern depredates a range of fish species, including sandeels and clupeids. Of its key prey species groups, clupeids are anticipated to be most impacted by underwater noise. Operation and maintenance phase activities within the array site which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1065. In relation to these Conservation Objective attributes, maintenance activities during the operational phase of the CWP Project array site may impact Arctic tern prey species through underwater noise effects, increases to suspended sediment concentrations, removal or alteration of important benthic habitats for those prey species, or electromagnetic field effects affecting prey species distributions around electrical infrastructure. Should these impacts to prey species reduce the availability of those prey species to foraging Arctic terns, this may result in effects to the demographic parameters, and resultant population dynamics, of this SCI through processes such as increased energetic consequences of foraging reducing individual condition and survival or productivity rates, or reduced provisioning rates to offspring reducing productivity rates. These potential consequences may compromise the ability of the SCI to maintain its population, with prey availability changes potentially resulting in there being insufficient habitat to support the SCI's population on a long-term basis.

1066. As operational phase activities within the array site will not include piling works or any other very high energy underwater noise inducing activities, and operational noise impact magnitudes to all potential prey species are assessed to be very low, there is not considered to be a pathway for operation and maintenance phase underwater noise impacts to have the potential to cause perceptible changes to prey availability in such a way that could impact this SCI.

1067. Similarly, as operational phase activities within the array site do not routinely require disturbance of the seabed (in the form of trenching or dredging activities) except within localised areas in which this is necessary to facilitate repairs, increased SSC levels, are considered to occur only potentially infrequently and locally during the operational phase and there is no perceptible pathway for this impact to have the potential to cause changes to prey availability during the operational phase in such a way that could impact this SCI.

1068. Key fish species, upon which Arctic tern predate, may experience the loss of up to 0.49 km^2 of previously available benthic habitat within the array site as a result of occupancy of the seabed by infrastructure during the operation and maintenance phase of the CWP Project. The spatial extent of such prey species habitat loss is, however, considered to be of negligible size in relation to this SCI's breeding and non-breeding season range extents.

1069. During the operation and maintenance phase, one additional potential impact to seabird receptor prey species which does not occur during the construction phase is considered, namely EMF effects, associated with electricity passing along infrastructure cables. Any effects on fish are anticipated to occur within the immediate vicinity of the cable and effect levels are likely to be low in relation to background levels associated with the Earth's magnetic field. The magnitude of such impacts to potentially sensitive fish species are assessed as being very low. Consequently, there is not considered to be a pathway for operation and maintenance phase EMF impacts to have the potential to cause impacts to prey availability in such a way that could impact this SCI.

1070. Despite the above potential pathway to impact in the form of benthic habitat loss, the area in which impacts to prey species availability may occur represents a negligible proportion of sea area within the foraging range of Arctic tern breeding within the Dalkey Islands SPA (mean-maximum + 1. S.D. = 40.5 km, Woodward et al., 2019) and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

1071. In the context of the extent of available habitat within foraging range of the SPA, the negligible proportion of that habitat in which potential impacts to prey species may occur, and that potential impacts to prey species may be of limited (if any) demographic consequence to their seabird predators, the scale of changes in prey availability impacts associated with operation and maintenance phase activities within the array site is considered to be negligible.

1072. In particular, potential changes to prey availability resultant from operation and maintenance phase activities within the array site are not expected to perceptibly increase the energetic costs of foraging, or lead to reductions in offspring provisioning rates for the Arctic tern SCI of Dalkey Islands SPA in such a way as to affect demographic parameters. Accordingly, the level of impact is not considered capable of altering the availability of prey species in such a way as to result in a significant decline in the breeding population abundance of this SPA SCI.

1073. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of this SPA SCI. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA.

Proposed mitigation

1074. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1075. As per project-only assessment, above.

OECC

Project-only assessment

1076. Arctic tern depredates a range of fish species, including sandeels and clupeids. Of its key prey species groups clupeids are anticipated to be most impacted by underwater noise. Operation and maintenance phase activities within the OECC which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1077. In relation to these Conservation Objective attributes, maintenance activities during the operational phase of the OECC may impact Arctic tern prey species through underwater noise effects, increases to suspended sediment concentrations, removal or alteration of important benthic habitats for those prey species, or electromagnetic field effects affecting prey species distributions around electrical infrastructure. Should these impacts to prey species reduce the availability of those prey species to foraging Arctic tern, this may result in effects to the demographic parameters, and resultant population dynamics, of this SCI through processes such as increased energetic consequences of foraging reducing individual condition and survival or productivity rates, or reduced provisioning rates to offspring reducing productivity rates. These potential consequences may compromise the ability of the SCI to maintain its population, with prey availability changes potentially resulting in there being insufficient habitat to support the SCI's population on a long-term basis.

1078. As operational phase activities within the OECC will not include piling works or any other very high energy underwater noise inducing activities, and operational noise impact magnitudes to all potential prey species are assessed to be very low, there is not considered to be a pathway for operation and maintenance phase underwater noise impacts to have the potential to cause perceptible changes to prey availability in such a way that could impact this SCI.

1079. Similarly, as operational phase activities within the OECC do not routinely require disturbance of the seabed (in the form of trenching or dredging activities) except within localised areas in which this is necessary to facilitate repairs, increased SSC levels, are considered to occur only potentially infrequently and locally during the operational phase and there is no perceptible pathway for this impact to have the potential to cause changes to prey availability during the operational phase in such a way that could impact this SCI.

1080. Key fish species, upon which Arctic tern depredate, may experience the loss of up 0.11 km^2 of previously available benthic habitat within the OECC as a result of alteration of the seabed during the operation and maintenance phase of the Project. The areas which may experience long-term alteration of any benthic habitats which have the potential to support populations of key seabird prey species constitute only a very small proportion (<1%) of the extent of Arctic tern foraging areas.

1081. During the operation and maintenance phase, one additional potential impact to seabird receptor prey species which does not occur during the construction phase is considered, namely EMF effects, associated with electricity passing along infrastructure cables. Any effects on fish are anticipated to occur within the immediate vicinity of the cable and effect levels are likely to be low in relation to background levels associated with the Earth's magnetic field. The magnitude of such impacts to potentially sensitive fish species are assessed as being very low. Consequently, there is not considered to be a pathway for operation and maintenance phase EMF impacts to have the potential to cause impacts to prey availability in such a way that could impact this SCI.

1082. Despite the above potential pathway to impact in the form of benthic habitat loss, the area in which impacts to prey species availability may occur represents a negligible proportion of sea area within the foraging range of arctic tern breeding within this SPA (mean-maximum + 1. S.D. = 40.5 km, Woodward et al., 2019) and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

1083. In the context of the extent of available habitat within foraging range of the SPA, the negligible proportion of that habitat in which potential impacts to prey species may occur, and that potential impacts to prey species may be of limited (if any) demographic consequence to their seabird predators, the scale of changes in prey availability impacts associated with operation and maintenance phase activities within the array site is considered to be negligible.

1084. In particular, potential changes to prey availability resultant from operation and maintenance phase activities within the array site are not expected to perceptibly increase the energetic costs of foraging, or lead to reductions in offspring provisioning rates for this SPA SCI in such a way as to affect demographic parameters. Accordingly, the level of impact is not considered capable of altering the availability of Arctic tern prey species in such a way as to result in a significant decline in the breeding population abundance of this SPA SCI.

1085. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of this SPA SCI. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA.

Proposed mitigation

1086. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1087. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

1088. Given the proximity of Dalkey Islands SPA to South Dublin Bay, Arctic tern which utilise habitats within Dalkey Islands SPA are also likely to use intertidal areas within South Dublin Bay over the course of the post-breeding periods in which they typically occupy the Dublin Bay area in greatest numbers. As such, they may experience changes in prey availability impacts from operation and maintenance phase activities within this area.

1089. Arctic tern depredates a range of fish species, including sandeels and clupeids. Of its key prey species groups, clupeids are anticipated to be most impacted by underwater noise during the operation and maintenance phase. Operation and maintenance phase activities within the OECC intertidal landfall area which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1090. Following installation of the OECC through the intertidal zone from the transition zone to the TJBs at the landfall location, the operational nature of any buried infrastructure within South Dublin Bay is passive. Any routine visual inspection of the OECC does not extend to buried infrastructure within the functionally connected South Dublin Bay and River Tolka Estuary SPA.

1091. It is possible that unplanned maintenance may be required on buried infrastructure within South Dublin Bay during the operational phase of the project. In relation to these Conservation Objective attributes any such unplanned maintenance activities have the potential to cause disturbance and displacement to arctic tern within the vicinity of the impacted area. It is considered, however, that any unplanned maintenance activities on buried infrastructure within South Dublin Bay during the operational phase of the project would be restricted in terms of their frequency, temporal duration and spatial scale.

1092. The extent of intertidal areas (between MLWS and MHWS) within South Dublin Bay is approximately 21.94 km^2, within which approximately 0.16 km^2 (0.72%) are predicted to be disturbed during landfall cable installation (**Chapter 4: Project Description**; **Section 4.8**). The scale of any maintenance to buried infrastructure carried out during the operation and maintenance phase will likely be considerably smaller than that during cable installation during the construction phase. As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during operation and maintenance activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

1093. It is therefore considered that there is no potential for AESI to result from changes in prey availability during operation and maintenance phase activities within the OECC intertidal landfall area in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-17**.

Proposed mitigation

1094. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1095. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1096. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-17**. With regards to changes in prey availability during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance impact 4 – Collision

Array site

1097. During the operation and maintenance phase of the CWP Project the presence of operational WTGs within the array site may result in the mortality of this SCI from this SPA through the collision of individuals with turbine blades. Collision mortality has the potential to impact on the following Conservation Objective attribute and target for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats.

1098. In relation to this Conservation Objective attribute, mortality resultant from collision with operational WTGs within the array site may directly affect the overall survival rate of this SPA SCI. Furthermore, collision mortality may also adversely affect the overall productivity rate of this SPA SCI through reductions to offspring provisioning rates and other parental care metrics. These potential consequences may compromise the ability of the SCI to maintain its population on a long-term basis.

1099. Flight activity by this SCI recorded within the array site during baseline surveys was extremely low throughout the baseline survey period (see **Appendix 10.5: Baseline Characterisation Report** of the EIAR). Consequently, CRM has not been undertaken for this species on the basis that flight densities within the array site are extremely low and that resultant mortality rates to this SCI would be negligible.

1100. As additional mortality to this SPA SCI resulting from collision with operational WTGs is estimated to represent only a negligible potential increase to SPA baseline mortality rates, this impact is considered not to impede the overall objective of maintaining / restoring the favourable conservation condition of the SPA SCI. Specifically, collision mortality will not affect the population dynamics of the SCI in such a way as to compromise its ability to maintain itself on a long-term basis as a viable component of its natural habitats. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

1101. No specific mitigation is proposed, or required, in respect of collision during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1102. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1103. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-17**. With regards to collision impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

2.4.3 Receptor 3: Roseate tern

Construction Phase Impacts

Construction phase impact 1 – Direct effects on habitat

Array site

1104. With regards to the array site, relevant construction phase direct effects on habitat relate to the alteration of ex situ sea-surface areas as they become occupied by the footprint of installed

infrastructure and, therefore, unavailable for use by seabird SCIs to undertake non-foraging behaviours.

1105. As construction of the array site progresses through its planned duration of approximately 2.5 years, the above sea level spatial extent of infrastructure will increase to a maximum of less than 0.005 km^2 within the array site (i.e., combined sea level area of all WTGs and OSSs). This ex situ direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1106. In relation to these Conservation Objective attributes, construction within the array site may reduce the ex situ marine areas in which individuals can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of construction phase activities within the array site may affect the energetic costs of non-foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

1107. Despite the above potential pathways to impact, these direct effects on habitat do not affect any area of the SPA (and hence do not affect the distribution of foraging, roosting or breeding habitat of this SCI within the SPA). Further, the area of ex situ habitat loss represents a negligible proportion of sea area within the foraging range (mean-maximum + 1. S.D. = 23.2 km, Woodward et al., 2019) of roseate tern breeding within Dalkey Islands SPA and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

1108. In the context of the area of available habitat within foraging range of the SPA, and the negligible proportion that will be lost ex situ within the array site during construction, the scale of direct effects on habitat within the array site is considered to be negligible. In particular, the reduction in ex situ marine areas in which to undertake non-foraging behaviours, or requirement to use alternative areas for non-foraging behaviours, is not expected to give rise to energetic costs of non-foraging behaviours in such a way as to affect the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of resulting in a significant decline in the breeding population abundance or passage population of the roseate tern SCI.

1109. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of roseate tern in the SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on Dalkey Islands SPA.

Proposed mitigation

1110. No specific mitigation is proposed or required in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1111. As per project-only assessment, above.

OECC (Intertidal Landfall)

1112. Given the proximity of Dalkey Islands SPA to South Dublin Bay, roseate tern which utilise habitats within Dalkey Islands SPA, are also likely over the course post-breeding period, in which they typically occupy the Dublin Bay area in greatest numbers, to use intertidal areas within South Dublin Bay and, as such may experience direct effects on habitat from construction phase activities within this area.

Project-only assessment

1113. Impacts considered to be direct effects on habitat may arise as a consequence of activities which temporarily disturb areas of ex situ intertidal habitat which are utilised by ornithological SCIs. There is no ex situ or in situ direct loss or removal of intertidal habitat proposed by the CWP project. Ex situ direct effects to intertidal areas which may be utilised by birds for non-foraging behaviours (such as roosting, loafing and maintenance) are considered only to relate to the physical footprint of the proposed intertidal infrastructure and works (i.e., the intertidal cable route during construction and any infrastructure at the proposed landfall location).

1114. The non-foraging capacity in which the roseate tern SCI is considered primarily to use the ex situ intertidal habitat within South Dublin Bay is for roosting aggregations, especially during the post-breeding period (mid-July to early September).

1115. Ex situ direct effects on intertidal habitat have the potential to impact on the following Conservation Objective attributes and targets for the roseate tern SCI of Dalkey Islands SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1116. In relation to these Conservation Objective attributes, construction in the OECC landfall area may temporarily reduce the ex situ areas in which individuals can undertake non-foraging behaviours (such as roosting) or require individuals to use alternative areas for these non-foraging behaviours. These impacts may affect energetic costs of non-foraging behaviours, which may in turn affect the condition of individuals and survival rates.

1117. The spatial extent of ex situ intertidal habitat within South Dublin Bay and River Tolka Estuary SPA, which may act as supporting habitat for the tern SCIs of Dalkey Islands SPA, is 21.94 km^2. There will be no in situ direct effects on the Dalkey Islands SPA, the following analysis considers ex situ interactions in the South Dublin Bay and River Tolka Estuary SPA which may be utilised by this SPA SCI as a component of its broader natural range. Approximately 0.16 km^2 of intertidal habitat within South Dublin Bay and River Tolka Estuary SPA is estimated to be subject to direct effects as a result of intertidal cable landfall activities (0.04 km^2 from open cut landfall cable duct installation, 0.006 km^2 from cofferdam installation, and 0.11 km^2 from cable laying activities in the transition zone). This equates to approximately 0.72% of the total ex situ intertidal habitat area within South Dublin Bay and River Tolka Estuary SPA being subject to temporary direct effects on habitat during the construction phase of the proposed intertidal landfall works.

1118. Following the backfilling of any excavated sections of trenching and removal of any supporting vehicles and / or infrastructure, it is considered that the re-establishment of intertidal habitat available to birds for non-foraging activities would occur rapidly due to the dynamic nature of intertidal habitats within South Dublin Bay. Any effects on the physical habitat around active intertidal construction loci would be brief, lasting less than several tidal cycles. Intertidal mudflats are considered resilient to isolated physical disturbances and can recover well (OSPAR, 2023).

1119. Despite the above potential pathways to impact, in the context of the negligible proportion of ex situ intertidal habitat which will be affected during construction and the short-term temporary nature of the effects to those habitats, the scale of direct effects on habitat within the OECC intertidal landfall area is considered to be negligible. In particular, the reduction in intertidal areas in which non-foraging behaviours are undertaken (including potential roosting areas used by roseate tern during the post-breeding period), or requirement to use alternative areas for non-foraging behaviours, is not expected to give rise to energetic costs of non-foraging behaviours in such a way as to affect the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of resulting in a significant decline in the breeding population abundance or passage population of the roseate tern SCI.

1120. Similarly, temporary negligible short-term effects on the distribution of roseate tern ex situ roosting areas will not constitute any significant decline in relation to this Conservation Objective attribute.

1121. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of roseate tern in the functionally connected South Dublin Bay and River Tolka Estuary SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the Dalkey Islands SPA.

Proposed mitigation

1122. No specific mitigation is proposed, or required, in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1123. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1124. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-17**. With regards to direct effects on habitat impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Construction phase impact 2 – Disturbance and displacement

OECC (intertidal landfall)

Project-only assessment

1125. Given the proximity of Dalkey Islands SPA to South Dublin Bay, roseate tern, which utilise habitats within Dalkey Islands SPA, are also likely to use ex situ intertidal areas within South Dublin Bay over the course of the post-breeding period, in which they typically occupy the wider Dublin Bay area in greatest numbers. As such, roseate tern may experience ex situ disturbance and displacement from construction phase activities within this area.

1126. Common tern, Arctic tern and roseate tern are three closely related and morphologically similar species. During the post-breeding period and given the low-light conditions in which these species

primarily utilise the ex situ intertidal habitats of South Dublin to form nocturnal roosting aggregations, it was generally not possible to differentiate these species during baseline surveys which were used to determine the number of individuals of these SCIs which may experience disturbance and displacement during crepuscular or nocturnal construction phase activities within the intertidal part of the OECC. Consequently, these species are considered collectively in relation to construction phase disturbance and displacement at the OECC intertidal landfall location. This means that when the impact values for *Sterna* terns are related to the population size of a particular species, the estimates of the proportions impacted are very precautionary.

1127. Disturbance and displacement have the potential to impact on the following Conservation Objective attributes and targets for the roseate tern SCI of Dalkey Islands SPA on an ex situ basis:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1128. In relation to these Conservation Objective attributes, construction within the OECC intertidal landfall area may temporarily reduce the ex situ areas in which individuals can undertake non-foraging behaviours (such as roosting) or require individuals to use alternative areas for these non-foraging behaviours. These impacts may affect energetic costs of such non-foraging behaviours, which may in turn affect condition of individuals and survival rates.

1129. Acoustic stimuli associated with any given piling event during daylight hours, when terns are not forming nocturnal roosting aggregations within South Dublin Bay (from sunrise until approximately two hours before sunset (Tierney et al., 2016)), will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within ex situ intertidal habitat within the vicinity of the OECC intertidal landfall area (up to 0.3 individuals where the greatest extent of mobile construction activities (i.e. Alternative Alignment for the purposes of Modelling scenario) are implemented). This represents a up to 1.07% of the average number of *Sterna* terns present within ex situ intertidal habitat within the South Dublin Bay section of the South Dublin Bay and River Tolka Estuary SPA during diurnal baseline surveys (28.02 individuals) and <0.01% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013–2018 (7,364 individuals - see Table 3.4 in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

1130. Visual stimuli associated with intertidal cable route installation activities between sunrise and approximately two hours before sunset, will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within ex situ intertidal habitat within the vicinity of the OECC intertidal landfall area (up to 2.88 individuals for the most impactful cable laying route selection). This represents a up to 10.26% of the average number of *Sterna* terns present within ex situ intertidal habitat within the South Dublin Bay section of the South Dublin Bay and River Tolka Estuary SPA during diurnal baseline surveys (28.02 individuals) and 0.04% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013–2018 (7,364 individuals - see Table 3.4 in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

1131. As such, given the very limited number of individuals potentially experiencing ex situ disturbance in relation to diurnal construction phase activities within intertidal areas of the functionally connected South Dublin and River Tolka Estuary SPA, there is no potential for AESI to result from such activities to the roseate tern SCI of Dalkey Islands SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-17**.

1132. Should, however, construction activities be undertaken during periods in which *Sterna* terns form post breeding roosting aggregations within South Dublin Bay (specifically between one hour before sunset through to sunrise, from mid-July to September, inclusive), acoustic and visual stimuli from such activities may result in potential ex situ disturbance impacts to larger numbers of *Sterna* terns within intertidal areas of South Dublin Bay, than if activities were conducted outside of these periods.

1133. Unlike during diurnal periods, for which information relating to the ecological sensitivity of Sterna terns to visual and acoustic stimuli is available, disturbance responses of nocturnal roosting terns to such stimuli are unknown. As such, in the absence of being able to overlap disturbance effect ranges with receptor distributions, to inform the assessment of potential ex situ disturbance and displacement impact magnitudes to roosting tern receptors from Dalkey Islands SPA for intertidal cable installation scenarios, the distribution of potential acoustic (piling) and visual (cable route laying) nocturnal disturbance sources are compared to roosting tern aggregation locations noted during baseline post-breeding tern aggregation surveys (**Figure 2-1**) and roosting tern aggregation locations which have been noted during other surveys of South Dublin Bay (**Figure 2-3** to **Figure 2-5**).

1134. This comparison of ex situ tern roosting locations and cable route infrastructure indicates that, should cable route installation activities be undertaken during periods where roosting terns occupy roost sites, whilst there is uncertainty on the magnitude of the impact, there is the potential for disturbance impacts to large or very large proportions of large or very large numbers of roosting individuals within South Dublin Bay.

1135. As such, despite the limited duration of potential acoustic and visual disturbance impacts, there is assessed to be the potential for AESI to result from such activities to the roseate tern SCI of Dalkey Islands SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-17**.

Proposed mitigation

1136. As ex situ intertidal habitats within South Dublin Bay are primarily used by *Sterna* tern species during their post-breeding migration periods (mid-July to late September) as nocturnal roosting areas, additional mitigation in the form of daily temporal restrictions (during the mid-July to late August period) is considered to be effective to ensure no AESI to the roseate tern SCI of the Dalkey Islands SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-17**.

1137. It should be noted that whilst it is not possible to quantify the reduction in the ex situ impact through the implementation of this mitigation, the level of ex situ impact with the mitigation in place can be certain.

1138. Full details of this daily temporal restriction additional mitigation are as follows:

- No construction phase cable route installation or associated activities, including preparatory works, will be undertaken between one hour prior to sunset and the following sunrise within the South Dublin Bay area during the period of mid-July to August, inclusive; and
- This area corresponds with the extent of intertidal habitat (areas between Mean Low Water Springs (MLWS) and MHWS) within the South Dublin Bay part of the functionally connected South Dublin Bay and River Tolka Estuary SPA, and also includes a small area of terrestrial habitat covering the Goose Green area at Poolbeg.

Residual impacts

1139. With the daily temporary restrictions applied during the post-breeding period between mid-July to August, inclusive, potential project-only disturbance and displacement impacts are assessed as follows:

1140. Acoustic stimuli associated with any given piling event within the period of April to August, inclusive, and during daylight hours (from sunrise until approximately one hour before sunset (Tierney et al., 2016), between mid-July and August, inclusive), will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within ex situ habitats within the functionally connected South Dublin Bay and River Tolka Estuary SPA (up to 0.79 individuals where the greatest extent of

mobile construction activities (i.e., Alternative Alignment for the purposes of Modelling scenario) are implemented). This represents up to 1.00% of the average number of *Sterna* terns present within South Dublin Bay during diurnal baseline surveys between April and August, inclusive (79.27 individuals) and 0.01% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013–2018 (7,364 individuals - see Table 3.4 in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

1141. Visual stimuli associated with intertidal cable route installation activities within this period, will, on average, result in potential disturbance to only a very small number of *Sterna* terns present within ex situ habitats within the functionally connected South Dublin Bay and River Tolka Estuary SPA (up to 7.47 individuals for the most impactful cable laying route selection). This represents a up to 9.42% of the average number of *Sterna* terns present within South Dublin Bay during diurnal baseline surveys between April and August, inclusive (79.27 individuals) and 0.10% of the mean peak count of *Sterna* terns from post-breeding tern aggregation surveys in South Dublin Bay 2013–2018 (7,364 individuals - see Table 3.4 in **Technical Appendix 10.5 Baseline Characterisation Report** of the EIAR).

1142. With the implementation of mitigation as outlined above, given the very limited number of individuals potentially experiencing disturbance in relation to construction phase activities within ex situ intertidal areas of the functionally connected South Dublin and River Tolka Estuary SPA, there is no potential for AESI to result from such activities to the roseate tern SCI of Dalkey Islands SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-17**.

Project-only effect on site integrity conclusion for impact

1143. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-17**. With regards to disturbance and displacement impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI**.

Construction phase impact 3 – Changes in prey availability

Array site

Project-only assessment

1144. As the array site does not overlap this SPA and the SPA is beyond the range in which prey species may experience potential impacts from construction phase works, potential changes in prey availability impacts will occur entirely outside of the SPA, i.e., all impacts assessed here relate to prey species within ex situ habitats which may support this SPA SCI.

1145. Roseate tern depredates a range of fish species, including sandeels, sprats and herring. Of its key prey species groups, herring are anticipated to be most impacted by underwater noise during the construction phase. Construction phase activities within the array site which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1146. These Conservation Objective attributes have the potential to be impacted through underwater noise injury, mortality or TTS impacts on prey species, primarily during piling operations, they may also be impacted by Increased suspended sediment impacts to seabird prey species, primarily from dredging and trenching.

1147. Injury or mortality for prey species may occur for individuals occurring very close to high noise level construction activities (primarily piling operations); however, such effects will be localised and will be minimised by 'soft start' procedures allowing mobile prey individuals to vacate very high noise level areas, prior to noise levels resulting in injury or mortality being reached. TTS impacts may result from exposure of prey species to lower underwater noise levels and consequently are experienced over a larger area than direct injury / mortality impacts.

1148. Mortality or injury-inducing underwater noise impacts to these prey species groups (primarily in relation to pile driving for WTG and OSS foundation installation over up to 262.5 days, over a period of up to 3 years) are calculated to occur within only very low proportions of theoretical roseate tern breeding season foraging areas around any given colony: less than 4.02% (mortality) and 11.12% (injury) of foraging areas estimated to be impacted for colonies within foraging range of the array site (mean-maximum + 1. S.D. = 23.2 km, Woodward et al., 2019).

1149. TTS impacts to prey species are considered to be very temporary in nature, and as such will have very limited potential to result in population-level consequences to their seabird predators.

1150. The spatial extent of temporarily disturbed areas of benthic habitat during construction phase activities are also assessed to be of negligible size in relation to seabird breeding and non-breeding season range extents. For example, the maximum potential extent of removed or altered benthic habitat within the array site is 6.30 km^2, which equates to 0.75% of foraging areas available to colonies within foraging range of the array site (mean-maximum + 1. S.D. = 23.2 km, Woodward et al., 2019).

1151. It is expected that prey species likely to occur in the vicinity of construction activities within the array site will be largely unaffected by resultant low-level temporary increases in suspended sediment concentration, as the concentrations are likely to be within the range of natural variability tolerated by these species and will reduce to background concentrations within a very short period.

1152. Consequently, there is assessed to be no potential for AESI to result from changes in prey availability during construction phase activities within the array site in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-17**.

Proposed mitigation

1153. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1154. As per project-only assessment, above.

OECC

Project-only assessment

1155. Roseate tern depredates a range of fish species, including sandeels, sprats and herring. Of its key prey species groups, herring are anticipated to be most impacted by underwater noise during the

construction phase. Construction phase activities within the array site which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1156. These Conservation Objective attributes have the potential to be impacted through increased suspended sediment impacts to seabird prey species, primarily from dredging and trenching.

1157. Underwater noise impacts to prey species are anticipated to very limited, as no pile driving activities are proposed in relation to the installation of the export cable within OECC, with high energy underwater noise sources limited to the potential treatment of a small number of UXO (fewer than ten).

1158. The spatial extent of temporarily disturbed areas of ex situ benthic habitat during construction phase activities within the OECC (up to 5.63 km^2) is also assessed to be of negligible size in relation to this SCI's breeding and non-breeding season range extents. Within these areas, benthic communities are typically resilient to localised habitat disturbance, demonstrating high or very high levels of recoverability (i.e., within weeks or months).

1159. It is expected that prey species likely to occur in the vicinity of construction activities within the OECC will be largely unaffected by resultant low-level temporary increases in suspended sediment concentration, as the concentrations are likely to be within the range of natural variability tolerated by these species and will reduce to background concentrations within a very short period.

1160. Consequently, there is assessed to be no potential for AESI to result from changes in prey availability during construction phase activities within the OECC in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-17**.

Proposed mitigation

1161. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1162. As per project-only assessment, above.

OECC Intertidal landfall

Project-only assessment

1163. Given the proximity of Dalkey Islands SPA to South Dublin Bay, roseate tern which utilise habitats within Dalkey Islands SPA, are also likely over the course of the post-breeding periods in which they typically occupy the Dublin Bay area in greatest numbers, to use intertidal areas within South Dublin Bay and, as such may experience ex situ changes in prey availability impacts from construction phase activities within this area.

1164. Roseate tern depredates a range of fish species, including sandeels, sprats and herring. Of its key prey species groups, herring are anticipated to be most impacted by underwater noise during the construction phase. Construction phase activities within the OECC intertidal landfall area which may

result in ex situ effects upon those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1165. These Conservation Objective attributes have the potential to be impacted through a reduction in prey availability due to:

a. Increased suspended sediment levels may temporarily alter the distribution of fish and mobile invertebrate species should they respond to avoid areas of altered water column condition.

b. Alteration of ex situ habitats which support prey species may reduce the capacity of those habitats to hold or produce prey species, thereby reducing the abundance of prey available to foraging seabirds within and around impacted areas.

1166. The extent of intertidal areas (between MLWS and MHWS) within South Dublin Bay is approximately 21.94 km^2, within which approximately 0.16 km^2 (0.72%) are predicted to be disturbed during landfall cable installation (**Chapter 4: Project Description**; **Section 4.8**). As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during construction activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

1167. It is therefore considered that there is no potential for AESI to result from ex situ changes in prey availability during construction phase activities within the OECC intertidal landfall area in relation to the Conservation Objective and attributes and targets for this SCI, as stated in **Table 2-17**.

Proposed mitigation

1168. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1169. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1170. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-17**. With regards to changes in prey availability during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and Maintenance Phase Impacts

Operation and maintenance phase impact 1 – Direct effects on habitat

Array site

Project-only assessment

1171. With regards to the array site, relevant operation and maintenance phase direct effects on habitat relate to the occupation of sea surface areas by the footprint of operational infrastructure and therefore become unavailable for use by seabird SCIs to undertake non-foraging behaviours. As the array site does not overlap this SPA, all direct effects on habitat will occur entirely outside of the SPA, i.e., all direct effects assessed here relate to ex situ habitats which may support the roseate tern SCI of Dalkey Islands SPA.

1172. As the operation and maintenance phase progresses through its planned duration of 25 years, the above sea level spatial extent of infrastructure will at no point exceed 0.005 km^2 within the array site (i.e., combined sea level area of all WTGs and OSSs). This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for the roseate tern SCI of Dalkey Islands SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1173. In relation to these Conservation Objective attributes, the presence of built infrastructure following the removal of previously available habitat may reduce the marine areas in which individuals can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of the spatial footprint of operational infrastructure within the array site may affect the energetic costs of non-foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

1174. Despite the above potential pathways to impact, these direct effects on habitat do not affect any area of the SPA (and hence do not affect the distribution of foraging, roosting or breeding habitat of this SCI within the SPA). Further, the area of habitat loss represents a negligible proportion of sea area within the foraging range (mean-maximum + 1. S.D. = 23.2 km, Woodward et al., 2019) of roseate tern breeding within Dalkey Islands SPA and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

1175. In the context of the extent of available habitat within foraging range of the SPA, and the negligible proportion that will be occupied by operational infrastructure, the scale of direct effects on habitat within the array site is considered to be negligible. In particular, the reduction in marine areas in which to undertake non-foraging behaviours, or requirement to use alternative areas for non-foraging behaviours, is not expected to give rise to energetic costs of non-foraging behaviours in such a way as to affect the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the breeding population abundance of this SPA SCI.

1176. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of roseate tern in the Dalkey Islands SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the SPA.

Proposed mitigation

1177. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1178. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

1179. Given the proximity of Dalkey Islands SPA to South Dublin Bay, roseate tern which utilise habitats within Dalkey Islands SPA, are also likely over the course of the post-breeding periods in which they typically occupy the Dublin Bay area in greatest numbers, to use intertidal areas within South Dublin Bay and, as such may experience direct effects on habitat from operation and maintenance phase activities within this area.

1180. Impacts considered to be direct effects on habitat may arise as a consequence of maintenance activities which temporarily remove or alter areas of intertidal habitat which are utilised by this SCI in ex situ areas of South Dublin Bay. Cable landfall duct maintenance activities and potential cable repair works during the operation and maintenance phase within South Dublin Bay have the potential to alter areas of intertidal habitat such that they become temporarily unavailable to roseate tern connected with Dalkey Islands SPA, which may otherwise utilise those areas for ex situ non-foraging behaviours.

1181. The non-foraging capacity in which the roseate tern SCI is considered primarily to use the intertidal habitat within South Dublin Bay is for roosting aggregations, especially during the post-breeding period (mid-July to early September).

1182. Direct effects on intertidal habitat have the potential to impact on the following Conservation Objective attributes and targets for the roseate tern SCI of Dalkey Islands SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1183. In relation to these Conservation Objective attributes, operation and maintenance of the CWP Project OECC intertidal landfall may result in temporary reductions in the spatial extent of the ex situ intertidal areas within South Dublin Bay in which individuals from Dalkey Islands SPA can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of operation and maintenance phase activities within the OECC intertidal landfall may directly affect demographic parameters (for example, use of alternative roosting areas may increase vulnerability to predation and reduce survival rates), or may affect the energetic costs of non-foraging behaviours through increased occupancy of sub-optimal area and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

1184. Despite the above potential pathways to impact, as the spatial extent of any ex situ temporary direct effects on intertidal habitats from maintenance activities will be, at most extremely localised, should extraction and reinstatement of intertidal areas be required, the level of impact is not considered capable of altering the extent of available ex situ habitat in such a way as to result in a significant

decline in the population of this SCI of Dalkey Islands SPA. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation conditions of the roseate tern SCI of Dalkey Islands SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to Dalkey Islands SPA.

Proposed mitigation

1185. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1186. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1187. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-17**. With regards to direct effects to habitat during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance phase impact 2 – Disturbance and displacement

OECC (intertidal landfall)

Project-only assessment

1188. Given the proximity of Dalkey Islands SPA to South Dublin Bay, roseate tern, which utilise habitats within Dalkey Islands SPA are also likely to use intertidal areas within South Dublin Bay over the course of the post-breeding periods in which they typically occupy the Dublin Bay area in greatest numbers. As such, roseate tern may experience ex situ disturbance and displacement impacts from operation and maintenance phase activities within this area.

1189. Disturbance and displacement have the potential to impact on the following Conservation Objective attributes and targets for the Arctic tern SCI of Dalkey Islands SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1190. Following installation of the OECC through the intertidal zone from the transition zone to the TJBs at the landfall location, the operational nature of any buried infrastructure within South Dublin Bay is passive. Any routine visual inspection of the OECC does not extend to buried infrastructure within South Dublin Bay.

1191. It is possible that unplanned maintenance may be required on buried infrastructure within the SPA during the operational phase of the project. In relation to these Conservation Objective attributes, any such unplanned maintenance activities have the potential to cause disturbance and displacement to Arctic tern within the vicinity of the impacted area. It is considered, however, that any unplanned

maintenance activities on buried infrastructure within South Dublin Bay during the operational phase of the project would be restricted in terms of their frequency, temporal duration and spatial scale, resulting in discrete areas of a visual disturbance of ~250m radius.

1192. Given the extent of intertidal habitat available to the SCI, the short temporal duration of any unplanned maintenance activities and the passive nature of the operation of buried infrastructure within the functionally connected South Dublin Bay and River Tolka Estuary SPA, it is considered such that there is no potential for AESI to the roseate tern SCI of Dalkey Islands SPA as a result of disturbance and displacement impacts during the operation and maintenance phase around the OECC intertidal landfall in relation to the Conservation Objectives, attributes and targets outlined in **Table 2-17**.

Proposed mitigation

1193. No specific mitigation is proposed, or required, in respect of disturbance and displacement during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1194. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1195. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-17**. With regards to disturbance and displacement during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance phase impact 3 – Changes in prey availability

Array site

1196. As the array site does not overlap this SPA and the SPA is beyond the range in which prey species may experience potential impacts from operation and maintenance phase works, potential changes in prey availability impacts will occur entirely outside of the SPA, i.e., all impacts assessed here relate to prey species within ex situ habitats which may support this SPA SCI.

1197. Roseate tern depredates a range of fish species, including sandeels, sprats and herring. Of its key prey species groups, herring are anticipated to be most impacted by underwater noise. Operation and maintenance phase activities within the array site which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1198. In relation to these Conservation Objective attributes, maintenance activities during the operational phase of the CWP Project array site may impact roseate tern prey species through underwater noise effects, increases to suspended sediment concentrations, removal or alteration of important benthic habitats for those prey species, or electromagnetic field effects affecting prey species distributions

around electrical infrastructure. Should these impacts to prey species reduce the availability of those prey species to foraging roseate terns, this may result in effects to the demographic parameters, and resultant population dynamics, of this SCI through processes such as increased energetic consequences of foraging reducing individual condition and survival or productivity rates, or reduced provisioning rates to offspring reducing productivity rates. These potential consequences may compromise the ability of the SCI to maintain its population, with prey availability changes potentially resulting in there being insufficient habitat to support the SCI's population on a long-term basis.

1199. As operational phase activities within the array site will not include piling works or any other very high energy underwater noise inducing activities, and operational noise impact magnitudes to all potential prey species are assessed to be very low, there is not considered to be a pathway for operation and maintenance phase underwater noise impacts to have the potential to cause perceptible changes to prey availability in such a way that could impact this SCI.

1200. Similarly, as operational phase activities within the array site do not routinely require disturbance of the seabed (in the form of trenching or dredging activities) except within localised areas in which this is necessary to facilitate repairs, increased SSC levels, are considered to occur only potentially infrequently and locally during the operational phase and there is no perceptible pathway for this impact to have the potential to cause changes to prey availability during the operational phase in such a way that could impact this SCI.

1201. Key fish species, upon which roseate tern predate, may experience the loss of up to 0.49 km^2 of previously available benthic habitat within the array site as a result of occupancy of the seabed by infrastructure during the operation and maintenance phase of the CWP Project. The spatial extent of such prey species habitat loss is, however, considered to be of negligible size in relation to this SCI's breeding and non-breeding season range extents.

1202. During the operation and maintenance phase, one additional potential impact to seabird receptor prey species which does not occur during the construction phase is considered, namely EMF effects, associated with electricity passing along infrastructure cables. Any effects on fish are anticipated to occur within the immediate vicinity of the cable and effect levels are likely to be low in relation to background levels associated with the Earth's magnetic field. The magnitude of such impacts to potentially sensitive fish species are assessed as being very low. Consequently, there is not considered to be a pathway for operation and maintenance phase EMF impacts to have the potential to cause impacts to prey availability in such a way that could impact this SCI.

1203. Despite the above potential pathway to impact in the form of benthic habitat loss, the area in which impacts to prey species availability may occur represents a negligible proportion of sea area within the foraging range of roseate tern breeding within the Dalkey Islands SPA (mean-maximum + 1. S.D. = 23.2 km, Woodward et al., 2019) and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

1204. In the context of the extent of available habitat within foraging range of the SPA, the negligible proportion of that habitat in which potential impacts to prey species may occur, and that potential impacts to prey species may be of limited (if any) demographic consequence to their seabird predators, the scale of changes in prey availability impacts associated with operation and maintenance phase activities within the array site is considered to be negligible.

1205. In particular, potential changes to prey availability resultant from operation and maintenance phase activities within the array site are not expected to perceptibly increase the energetic costs of foraging, or lead to reductions in offspring provisioning rates for the roseate tern SCI of Dalkey Islands SPA in such a way as to affect demographic parameters. Accordingly, the level of impact is not considered capable of altering the availability of prey species in such a way as to result in a significant decline in the breeding population abundance of this SPA SCI.

1206. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of this SPA SCI. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA.

Proposed mitigation

1207. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1208. As per project-only assessment, above.

OECC

Project-only assessment

1209. Roseate tern depredates a range of fish species, including sandeels, sprats and herring. Of its key prey species groups, herring are anticipated to be most impacted by underwater noise. Operation and maintenance phase activities within the OECC which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1210. In relation to these Conservation Objective attributes, maintenance activities during the operational phase of the OECC may impact roseate tern prey species through underwater noise effects, increases to suspended sediment concentrations, removal or alteration of important benthic habitats for those prey species, or electromagnetic field effects affecting prey species distributions around electrical infrastructure. Should these impacts to prey species reduce the availability of those prey species to foraging roseate tern, this may result in effects to the demographic parameters, and resultant population dynamics, of this SCI through processes such as increased energetic consequences of foraging reducing individual condition and survival or productivity rates, or reduced provisioning rates to offspring reducing productivity rates. These potential consequences may compromise the ability of the SCI to maintain its population, with prey availability changes potentially resulting in there being insufficient habitat to support the SCI's population on a long-term basis.

1211. As operational phase activities within the OECC will not include piling works or any other very high energy underwater noise inducing activities, and operational noise impact magnitudes to all potential prey species are assessed to be very low, there is not considered to be a pathway for operation and maintenance phase underwater noise impacts to have the potential to cause perceptible changes to prey availability in such a way that could impact this SCI.

1212. Similarly, as operational phase activities within the OECC do not routinely require disturbance of the seabed (in the form of trenching or dredging activities) except within localised areas in which this is necessary to facilitate repairs, increased SSC levels, are considered to occur only potentially infrequently and locally during the operational phase and there is no perceptible pathway for this impact to have the potential to cause changes to prey availability during the operational phase in such a way that could impact this SCI.

1213. Key fish species, upon which roseate tern depredate, may experience the loss of up 0.11 km^2 of previously available benthic habitat within the OECC as a result of alteration of the seabed during the operation and maintenance phase of the Project. The areas which may experience long-term alteration of any benthic habitats which have the potential to support populations of key seabird prey species constitute only a very small proportion (<1%) of the extent of roseate tern foraging areas.

1214. During the operation and maintenance phase, one additional potential impact to seabird receptor prey species which does not occur during the construction phase is considered, namely EMF effects, associated with electricity passing along infrastructure cables. Any effects on fish are anticipated to occur within the immediate vicinity of the cable and effect levels are likely to be low in relation to background levels associated with the Earth's magnetic field. The magnitude of such impacts to potentially sensitive fish species are assessed as being very low. Consequently, there is not considered to be a pathway for operation and maintenance phase EMF impacts to have the potential to cause impacts to prey availability in such a way that could impact this SCI.

1215. Despite the above potential pathway to impact in the form of benthic habitat loss, the area in which impacts to prey species availability may occur represents a negligible proportion of sea area within the foraging range of roseate tern breeding within this SPA (mean-maximum + 1. S.D. = 23.2 km, Woodward et al., 2019) and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

1216. In the context of the extent of available habitat within foraging range of the SPA, the negligible proportion of that habitat in which potential impacts to prey species may occur, and that potential impacts to prey species may be of limited (if any) demographic consequence to their seabird predators, the scale of changes in prey availability impacts associated with operation and maintenance phase activities within the array site is considered to be negligible.

1217. In particular, potential changes to prey availability resultant from operation and maintenance phase activities within the array site are not expected to perceptibly increase the energetic costs of foraging, or lead to reductions in offspring provisioning rates for this SPA SCI in such a way as to affect demographic parameters. Accordingly, the level of impact is not considered capable of altering the availability of roseate tern prey species in such a way as to result in a significant decline in the breeding population abundance of this SPA SCI.

1218. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of this SPA SCI. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA.

Proposed mitigation

1219. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1220. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

1221. Given the proximity of Dalkey Islands SPA to South Dublin Bay, roseate tern which utilise habitats within Dalkey Islands SPA are also likely to use intertidal areas within South Dublin Bay over the course of the post-breeding periods in which they typically occupy the Dublin Bay area in greatest numbers. As such, they may experience changes in prey availability impacts from operation and maintenance phase activities within this area.

1222. Roseate tern depredates a range of fish species, including sandeels and clupeids. Of its key prey species groups, clupeids are anticipated to be most impacted by underwater noise during the operation and maintenance phase. Operation and maintenance phase activities within the OECC intertidal landfall area which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1223. Following installation of the OECC through the intertidal zone from the transition zone to the TJBs at the landfall location, the operational nature of any buried infrastructure within South Dublin Bay is passive. Any routine visual inspection of the OECC does not extend to buried infrastructure within the functionally connected South Dublin Bay and River Tolka Estuary SPA.

1224. It is possible that unplanned maintenance may be required on buried infrastructure within South Dublin Bay during the operational phase of the project. In relation to these Conservation Objective attributes any such unplanned maintenance activities have the potential to cause disturbance and displacement to roseate tern within the vicinity of the impacted area. It is considered, however, that any unplanned maintenance activities on buried infrastructure within South Dublin Bay during the operational phase of the project would be restricted in terms of their frequency, temporal duration and spatial scale.

1225. The extent of intertidal areas (between MLWS and MHWS) within South Dublin Bay is approximately 21.94 km^2, within which approximately 0.16 km^2 (0.72%) are predicted to be disturbed during landfall cable installation (**Chapter 4: Project Description**; **Section 4.8**). The scale of any maintenance to buried infrastructure carried out during the operation and maintenance phase will likely be considerably smaller than that during cable installation during the construction phase. As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during operation and maintenance activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

1226. It is therefore considered that there is no potential for AESI to result from changes in prey availability during operation and maintenance phase activities within the OECC intertidal landfall area in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-17**.

Proposed mitigation

1227. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1228. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1229. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-17**. With regards to changes in prey availability during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance impact 4 – Collision

Array site

Project-only assessment

1230. During the operation and maintenance phase of the CWP Project the presence of operational WTGs within the array site may result in the mortality of this SCI from this SPA through the collision of individuals with turbine blades. Collision mortality has the potential to impact on the following Conservation Objective attribute and target for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats.

1231. In relation to this Conservation Objective attribute, mortality resultant from collision with operational WTGs within the array site may directly affect the overall survival rate of this SPA SCI. Furthermore, collision mortality may also adversely affect the overall productivity rate of this SPA SCI through reductions to offspring provisioning rates and other parental care metrics. These potential consequences may compromise the ability of the SCI to maintain its population on a long-term basis.

1232. Flight activity by this SCI recorded within the array site during baseline surveys was extremely low throughout the baseline survey period (**Appendix 10.5: Baseline Characterisation Report** of the EIAR). Consequently, CRM has not been undertaken for this species on the basis that flight densities within the array site are extremely low and that resultant mortality rates to this SCI would be negligible.

1233. As additional mortality to this SPA SCI resulting from collision with operational WTGs is estimated to represent only a negligible potential increase to SPA baseline mortality rates, this impact is considered not to impede the overall objective of maintaining / restoring the favourable conservation condition of the SPA SCI. Specifically, collision mortality will not affect the population dynamics of the SCI in such a way as to compromise its ability to maintain itself on a long-term basis as a viable component of its natural habitats. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

1234. No specific mitigation is proposed, or required, in respect of collision during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1235. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1236. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-17**. With regards to collision impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

2.5 The Murrough SPA (IE004186)

1237. SPA is designated in relation to the following SCIs which have been screened in for consideration within the NIS: herring gull, black-headed gull, red-throated diver, little tern, whooper swan, light-bellied brent goose, Greenland white-fronted goose, greylag goose, teal and wigeon.

1238. The minimum separation distance between SPA and the array site is 7.50 km.

1239. The minimum separation distance between SPA and the OECC is 0 km [OECC passes through offshore part of SPA – Area of overlap = 0.014 km^2].

1240. The minimum separation distance between SPA and the OECC intertidal landfall is 22.87 km (with a 'by-sea' separation distance of 23.77 km).

Table 2-22: Assessment of adverse effects on site integrity (project alone) - The Murrough SPA

Objective: Attributes and targets	Predicted effect	Link to assessment	Mitigation	Residual effect	Conclusion
Objective: To maintain or restore the favourable conservation condition of the SCI(s): 1. Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats. 2. The natural range of the SCI is neither being reduced nor is likely to be reduced for the foreseeable future. 3. There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.	Herring gull [A184]				
	Direct effects on habitat [1,3]	**Section 2.5.1**	None	No change	No AESI
	Disturbance and displacement [1,3]		None	No change	No AESI
	Changes in prey availability [1,3]		None	No change	No AESI
	Collision [1]		None	No change	No AESI
	Introduction or spread of invasive species [1,3]	See high-level assessment in **Section 2.1**			No AESI
	Black-headed gull [A179]				
	Direct effects on habitat [1,3]	**Section 2.5.2**	None	No change	No AESI
	Disturbance and displacement [1,3]		**Section 2.5.2**	**Section 2.5.2**	No AESI
	Changes in prey availability [1,3]		None	No change	No AESI
	Collision [1]		None	No change	No AESI
	Introduction or spread of invasive species [1,3]	See high-level assessment in **Section 2.1**			No AESI
	Red-throated diver [A001]				
	Direct effects on habitat [1,3]	**Section 2.5.3**	None	No change	No AESI
	Disturbance and displacement (including barrier effects) [1,3]		**Section 2.5.3**	**Section 2.5.3**	No AESI
	Changes in prey availability [1,3]		None	No change	No AESI
	Collision [1]		None	No change	No AESI
	Introduction or spread of invasive species [1,3]	See high-level assessment in **Section 2.1**			No AESI
	Little tern [A885]				

Objective: Attributes and targets	Predicted effect	Link to assessment	Mitigation	Residual effect	Conclusion
	Direct effects on habitat [1,3]	**Section 2.5.4**	None	No change	No AESI
	Changes in prey availability [1,3]		None	No change	No AESI
	Collision [1]		None	No change	No AESI
	Introduction or spread of invasive species [1,3]	See high-level assessment in **Section 2.1**			No AESI
	Whooper swan [A038], Light-bellied brent goose [A046], Greenland white-fronted goose [A395], Greylag goose [A043], Teal [A052], Wigeon [A855]				
	Direct effects on habitat [1,3]	**Section 2.5.5**	None	No change	No AESI
	Disturbance and displacement (including barrier effects) [1,3]		None	No change	No AESI
	Changes in prey availability [1,3]		None	No change	No AESI
	Collision [1]		None	No change	No AESI
	Introduction or spread of invasive species [1,3]	See high-level assessment in **Section 2.1**			No AESI

2.5.1 Receptor 1: Herring gull

Construction Phase Impacts

Construction phase impact 1 – Direct effects on habitat

Array site

Project-only assessment

1241. With regards to the array site, relevant construction phase direct effects on habitat relate to the alteration of sea surface areas as they become occupied by the footprint of installed infrastructure and, therefore, unavailable for use by seabird SCIs to undertake non-foraging behaviours. As the array site does not overlap this SPA, all direct effects on habitat will occur entirely outside of the SPA, i.e., all direct effects assessed here relate to ex situ habitats which may support the herring gull SCI of The Murrough SPA.

1242. As construction of the array site progresses through its planned duration of approximately 2.5 years, the above sea level spatial extent of infrastructure will increase to a maximum of less than 0.005 km^2 within the array site (i.e., combined sea level area of all WTGs and OSSs). This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for the herring gull SCI of The Murrough SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and

- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1243. In relation to these Conservation Objective attributes, construction of the CWP Project array site may reduce the marine areas in which individuals can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of construction phase activities within the array site may affect the energetic costs of non-foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

1244. Despite the above potential pathways to impact, these direct effects on habitat do not affect any area of the SPA (and hence do not affect the distribution of non-foraging habitat of this SCI within the SPA). Further, the area of habitat loss represents a negligible proportion of sea area within wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

1245. In the context of the extent of available habitat within foraging range of the SPA, and the negligible proportion that will be lost within the array site during construction, the scale of direct effects on habitat within the array site is considered to be negligible. In particular, the reduction in marine areas in which to undertake non-foraging behaviours, or requirement to use alternative areas for non-foraging behaviours, is not expected to give rise to energetic costs of non-foraging behaviours in such a way as to affect the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the breeding population abundance of the herring gull SCI of The Murrough SPA. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of the herring gull SCI of The Murrough SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to The Murrough SPA.

Proposed mitigation

1246. No specific mitigation is proposed or required in respect of direct effects on habitat during construction within the array site, as this impact will not give rise to any AESI in relation to The Murrough SPA.

Residual effect

1247. As per project-only assessment, above.

OECC intertidal landfall

Project-only assessment

1248. With regards to the OECC intertidal landfall, relevant construction phase direct effects on habitat relate to the temporary alteration of intertidal areas as they excavated and reinstated to facilitate laying of buried export cables through intertidal areas and temporarily unavailable for use by intertidal SCIs to undertake non-foraging behaviours. As the OECC intertidal landfall does not overlap this SPA, all direct effects on habitat will occur entirely outside of the SPA, i.e., all direct effects assessed here relate to ex situ habitats which may support the herring gull SCI of The Murrough SPA.

1249. Herring gull which winter within The Murrough SPA may also utilise ex situ intertidal areas within South Dublin Bay to undertake non-foraging behaviours (such as roosting, loafing or for maintenance

activities). Impacts considered to be direct effects on habitat may arise as a consequence of activities which remove or alter areas of intertidal habitat which are utilised by this SCI. Cable landfall duct installation and cable laying activities during the construction phase within South Dublin Bay have the potential to alter areas of intertidal habitat such that they become temporarily unavailable to herring gull connected with The Murrough SPA, which may otherwise utilise those areas for non-foraging behaviours.

1250. This ex situ direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for the herring gull SCI of The Murrough SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1251. In relation to these Conservation Objective attributes, construction of the CWP Project OECC intertidal landfall may reduce the ex situ intertidal areas within South Dublin Bay in which individuals connected with The Murrough SPA can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of construction phase activities within the OECC intertidal landfall may directly affect demographic parameters (for example, use of alternative roosting areas may increase vulnerability to predation and reduce survival rates), or may affect the energetic costs of non-foraging behaviours through increased occupancy of sub-optimal area and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

1252. Despite the above potential pathways to impact, these ex situ direct effects on habitat do not affect any area within The Murrough SPA (and hence do not affect the distribution of non-foraging habitat of this SCI within the SPA). Furthermore, given the separation distance between this SPA and the OECC intertidal landfall (a minimum straight-line distance of 22.87 km and 'by-sea' distance of 23.77 km), only a minimal number of individuals connected with The Murrough SPA are likely to be using impacted areas within South Dublin Bay for non-foraging behaviours at any given time. Accordingly, the numbers of such individuals expected to experience direct effect on habitat impacts from construction phase activities at the OECC intertidal landfall is considered negligible. As such, the potential for direct effects on habitat impacts at the OECC intertidal landfall affecting The Murrough SPA herring gull population is *de minimis*. Accordingly, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the breeding population abundance of the herring gull SCI of The Murrough SPA. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of the herring gull SCI of The Murrough SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to The Murrough SPA.

Proposed mitigation

1253. No specific mitigation is proposed or required in respect of direct effects on habitat during construction within the OECC intertidal landfall, as this impact will not give rise to any AESI in relation to The Murrough SPA.

Residual effect

1254. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1255. The Conservation Objective and its attributes and targets for the herring gull SCI of The Murrough SPA are presented in **Table 2-22**. With regards to direct effects on habitat impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for The Murrough SPA herring gull SCI**.

Construction phase impact 2 – Disturbance and displacement

OECC (Intertidal landfall)

Project-only assessment

1256. As the OECC intertidal landfall does not overlap this SPA and the SPA is beyond the extent of areas in which disturbance and displacement impacts are considered to occur surrounding construction phase works for the OECC intertidal landfall all disturbance and displacement impacts will occur entirely outside of the SPA, i.e. all disturbance and displacement impacts assessed here relate to ex situ habitats which may support the herring gull SCI of The Murrough SPA.

1257. Herring gull, which utilise habitats within The Murrough SPA, may also use ex situ intertidal areas at the OECC intertidal landfall within South Dublin Bay or surrounding areas during migratory periods or between site movements during the non-breeding period and, as such, may experience disturbance and displacement impacts in relation to construction phase activities at the OECC intertidal landfall within South Dublin Bay.

1258. Such ex situ disturbance and displacement impacts have the potential to affect the following Conservation Objective attributes and targets for the herring gull SCI of The Murrough SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1259. In relation to these Conservation Objective attributes, disturbance leading to temporary displacement of herring gull from ex situ intertidal habitats around construction activity within at the OECC intertidal landfall may lead to the temporary and localised exclusion of individuals from areas of habitat which would otherwise be used for foraging or other behaviours (i.e., temporary indirect habitat loss).

1260. Temporary localised reductions in the extent of ex situ intertidal habitat areas in which individuals can undertake foraging and non-foraging behaviours, which may require individuals to use alternative areas for such behaviours, may affect the energetic costs of those behaviours and, in turn, affect the condition of individuals and their consequent survival rates; and thereby compromise the ability of the SCI to maintain its population.

1261. Despite the above potential pathways to impact, given the separation distance between this SPA and the OECC intertidal landfall (a minimum straight-line distance of 22.87 km and 'by-sea' distance of 23.77 km), only a minimal number of individuals connected with The Murrough SPA are likely to be using impacted areas within South Dublin Bay at any given time. Accordingly, the numbers of such individuals expected to experience disturbance and displacement impacts from construction phase activities at the OECC intertidal landfall is considered negligible. As such, the potential for disturbance and displacement impacts at the OECC intertidal landfall affecting The Murrough SPA herring gull population is *de minimis*. Accordingly, the level of impact is not considered capable of resulting in a

significant decline in the non-breeding population abundance of the herring SCI of The Murrough SPA. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of the herring gull SCI of The Murrough SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to The Murrough SPA.

Proposed mitigation

1262. No specific mitigation is proposed or required in respect of disturbance and displacement during construction within the OECC intertidal landfall, as this impact will not give rise to any AESI in relation to The Murrough SPA.

Residual effect

1263. As per project only assessment, above.

Project-only effect on site integrity conclusion for impact

1264. The Conservation Objective and its attributes and targets for the herring gull SCI of The Murrough SPA are presented in **Table 2-22**. With regards to disturbance and displacement impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for The Murrough SPA herring gull SCI.**

Construction phase impact 3 – Changes in prey availability

Array site

Project-only assessment

1265. As the array site does not overlap this SPA and the SPA is beyond the range in which prey species may experience potential impacts from construction phase works, potential changes in prey availability impacts will occur entirely outside of the SPA, i.e., all impacts assessed here relate to prey species within ex situ habitats which may support the herring gull SCI of The Murrough SPA.

1266. Herring gull is a generalist and opportunist forager, whose diet comprises a range of fish and invertebrate species, as well as carrion and refuse. Construction phase activities within the array site which may affect herring gull prey species have the potential to impact on the following Conservation Objective attributes and targets for the herring gull SCI of The Murrough SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1267. In relation to these Conservation Objective attributes, construction of the CWP Project array site may impact herring gull prey species through underwater noise effects, increases to suspended sediment concentrations or temporary disturbance of important benthic habitats for those prey species. Should these impacts to prey species reduce the availability of those prey species to foraging herring gull, this

may result in effects to the demographic parameters, and resultant population dynamics, of this SCI through processes such as increased energetic consequences of foraging reducing individual condition and survival rates. These potential consequences may compromise the ability of the SCI to maintain its population, with prey availability changes potentially resulting in there being insufficient habitat to support the SCI's population on a long-term basis.

1268. As herring gull is a generalist forager, although fish species (including gadoids, sprats and sandeels) are anticipated to be impacted by underwater noise during the construction phase, these species are not considered to form a key part of the SCI's diet. Underwater noise impacts to gadoids, sprats and sandeels (primarily in relation to pile driving for WTG and OSS foundation installation which may occur over a total duration of 78 days [if a single piling event per 24-hour period is undertaken], within a broader construction window of 262.5 days) are therefore not considered to have potential to result in population level consequences to herring gull on account of the high-level of dietary flexibility demonstrated by this SCI.

1269. Suspended sediment plumes created during dredge disposal operations within the array site are predicted to enhance SSC levels over up to *c*. 7–9 km (depending on tidal conditions), for a duration of *c*.10–15 days and resulting in cumulative deposition thicknesses of *c*. 1–2 cm. Suspended sediment plumes created during trenching operations within the array site are predicted to enhance SSC levels over up to *c*. 10 km (depending on tidal conditions), for a duration of *c*. 15 days and resulting in cumulative deposition thicknesses of <1 cm. These areas affected by increased SSC levels during construction phase activities are assessed to be of negligible size in relation to seabird breeding and non-breeding season range extents, with impacts occurring over considerably shorter durations than underwater noise effects and are similarly considered unlikely to affect a key part of the very wide dietary range of this SCI. the array site the array site

1270. The spatial extent of temporarily disturbed of areas of benthic habitat during construction phase activities within the array site (up to 6.30 km^2) is also assessed to be of negligible size in relation to this SCI's breeding and non-breeding season range extents.

1271. Despite the above potential pathways to impact, the areas in which impacts to prey species availability may occur represent a negligible proportion of sea area within the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

1272. In the context of the extent of available habitat within range of the SPA, the negligible proportion of that habitat in which potential impacts to prey species may occur, the wide range of foraging resources used by herring gull and that potential temporary impacts to prey species may be of limited (if any) demographic consequence to their seabird predators, the scale of changes in prey availability impacts associated with construction phase activities within the array site is considered to be negligible.

1273. In particular, potential changes to prey availability resultant from construction phase activities within the array site are not expected to perceptibly increase the energetic costs of foraging, or lead to reductions in individual condition and survival rates of the herring gull SCI of The Murrough SPA in such a way as to affect demographic parameters. Accordingly, the level of impact is not considered capable of altering the availability of herring gull prey species in such a way as to result in a significant decline in the breeding population abundance of the herring gull SCI of The Murrough SPA. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of the herring gull SCI of The Murrough SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to The Murrough SPA

Proposed mitigation

1274. No specific mitigation is proposed or required in respect of changes in prey availability during construction within the array site, as this impact will not give rise to any AESI in relation to The Murrough SPA.

Residual effect

1275. As per project only assessment, above.

OECC

Project-only assessment

1276. As the OECC does not overlap this SPA and the SPA is beyond the range in which prey species may experience potential impacts from construction phase works, potential changes in prey availability impacts will occur entirely outside of the SPA, i.e., all impacts assessed here relate to prey species within ex situ habitats which may support the herring gull SCI of The Murrough SPA.

1277. Herring gull is a generalist and opportunist forager, whose diet comprises a range of fish and invertebrate species, as well as carrion and refuse. Construction phase activities within the OECC which may affect herring gull prey species have the potential to impact on the following Conservation Objective attributes and targets for the herring gull SCI of The Murrough SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1278. In relation to these Conservation Objective attributes, construction of the CWP Project OECC may impact herring gull prey species through underwater noise effects, increases to suspended sediment concentrations or temporary disturbance of important benthic habitats for those prey species. Should these impacts to prey species reduce the availability of those prey species to foraging herring gull, this may result in effects to the demographic parameters, and resultant population dynamics, of this SCI through processes such as increased energetic consequences of foraging reducing individual condition and survival or productivity rates, or reduced provisioning rates to offspring reducing productivity rates. These potential consequences may compromise the ability of the SCI to maintain its population, with prey availability changes potentially resulting in there being insufficient habitat to support the SCI's population on a long-term basis.

1279. As herring gull is a generalist forager, and underwater noise impacts to prey fish species (including gadoids, sprats and sandeels) are anticipated to be very limited, given that no pile driving activities are proposed in relation to the installation of the export cable within OECC, with high energy underwater noise sources limited to the potential treatment of a small number of UXO (fewer than ten), the associated scale of changes in prey availability resultant from construction phase activities within the OECC will be negligible.

1280. Areas affected by increased SSC levels during construction phase activities within the OECC are assessed to be of negligible size in relation to this SCI's breeding (mean-maximum foraging range + 1 S.D. = 85.6 km, Woodward et al., 2019) and non-breeding season range extents and occur over relatively short durations. Suspended sediment plumes created during dredge disposal operations within the OECC are predicted to enhance SSC levels over up to *c*. 4–5 km (depending on tidal

conditions), for a duration of *c*.10 days and resulting in cumulative deposition thicknesses of *c*. 1 cm. Suspended sediment plumes created during trenching operations within the OECC are predicted to enhance SSC levels over up *c*. 7 km (depending on tidal conditions), for a duration of *c*.10 days and resulting in cumulative deposition thicknesses of *c*. 1 cm. These areas affected by increased SSC levels during construction phase activities are assessed to be of negligible size in relation to seabird breeding and non-breeding season range extents, with impacts occurring over considerably shorter durations than underwater noise effects and are similarly considered unlikely to affect a key part of the very wide dietary range of this SCI.

1281. The spatial extent of temporarily disturbed of areas of benthic habitat during construction phase activities within the OECC (up to 5.63 km^2) is also assessed to be of negligible size in relation to this SCI's breeding and non-breeding season range extents. Within these areas benthic communities are typically resilient to localised habitat disturbance, demonstrating high or very high levels of recoverability (i.e., within weeks or months).

1282. Despite the above potential pathways to impact, the areas in which impacts to prey species availability may occur represent a negligible proportion of sea area within the foraging range of herring gull breeding within The Murrough SPA and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

1283. In the context of the extent of available habitat within foraging range of the SPA, the negligible proportion of that habitat in which potential impacts to prey species may occur, the wide range of foraging resources used by herring gull and that potential temporary impacts to prey species may be of limited (if any) demographic consequence to their seabird predators, the scale of changes in prey availability impacts associated with construction phase activities within the OECC is considered to be negligible.

1284. In particular, potential changes to prey availability resultant from construction phase activities within the OECC are not expected to perceptibly increase the energetic costs of foraging or lead to reductions in offspring provisioning rates for the herring gull SCI of The Murrough SPA in such a way as to affect demographic parameters. Accordingly, the level of impact is not considered capable of altering the availability of herring gull prey species in such a way as to result in a significant decline in the breeding population abundance of the herring gull SCI of The Murrough SPA. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of the herring gull SCI of The Murrough SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to The Murrough SPA.

Proposed mitigation

1285. No specific mitigation is proposed or required in respect of changes in prey availability during construction within the OECC, as this impact will not give rise to any AESI in relation to The Murrough SPA.

Residual effect

1286. As per project-only assessment, above.

OECC intertidal landfall

Project-only assessment

1287. Herring gull which winter within The Murrough SPA may utilise intertidal areas within South Dublin Bay for foraging. Changes to prey availability from construction phase activity for the OECC intertidal landfall may arise as a consequence of activities which remove or alter areas of intertidal prey species habitat, or otherwise alter conditions so as to reduce foraging efficiency. Specifically, cable landfall duct installation and cable laying activities during the construction phase within South Dublin Bay have the potential to affect areas of intertidal habitat such that prey species availability to herring gull is temporarily reduced within those areas.

1288. This change in prey species availability has the potential to impact on the following Conservation Objective attributes and targets for the herring gull SCI of The Murrough SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1289. In relation to these Conservation Objective attributes, construction of the CWP Project OECC intertidal landfall may reduce the extent and / or quality of intertidal areas in which individuals can undertake foraging behaviours or require individuals to use alternative areas for foraging behaviours. These potential consequences of construction phase activities within the OECC intertidal landfall may directly affect demographic parameters (for example, use of alternative foraging areas may affect the energetic costs of foraging behaviours through increased occupancy of sub-optimal foraging habitats and in turn the condition of individuals and their consequent survival and / or productivity rates), and thereby compromise the ability of the SCI to maintain its population.

1290. Despite the above potential pathways to impact, these changes in prey availability do not affect any area within The Murrough SPA (and hence do not affect the distribution of foraging habitat of this SCI within the SPA). Furthermore, given the separation distance between this SPA and the OECC intertidal landfall (a minimum straight-line distance of 22.87 km and 'by-sea' distance of 23.77 km), only a minimal number of individuals connected with The Murrough SPA are likely to be using impacted areas within South Dublin Bay for foraging behaviours at any given time. Accordingly, the numbers of such individuals expected to experience changes in prey availability impacts from construction phase activities at the OECC intertidal landfall is considered negligible. As such, the potential for changes in prey availability impacts at the OECC intertidal landfall affecting The Murrough SPA herring gull population is *de minimis*. Accordingly, the level of impact is not considered capable of altering the extent of prey availability in such a way as to result in a significant decline in the wintering population abundance of the herring gull SCI of The Murrough SPA. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of the herring gull SCI of The Murrough SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to The Murrough SPA.

Proposed mitigation

1291. No specific mitigation is proposed or required in respect of changes in prey availability during construction within the OECC intertidal landfall, as this impact will not give rise to any AESI in relation to The Murrough SPA.

Residual effect

1292. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1293. The Conservation Objective and its attributes and targets for the herring gull SCI of The Murrough SPA are presented in **Table 2-22**. With regards to changes in prey availability impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for The Murrough SPA herring gull SCI.**

Operation and Maintenance Phase Impacts

Operation and maintenance impact 1 – Direct effects on habitat

Array site

Project-only assessment

1294. With regards to the array site, relevant operation and maintenance phase direct effects on habitat relate to the occupation of sea surface areas by the footprint of operational infrastructure and unavailable for use by seabird SCIs to undertake non-foraging behaviours. As the array site does not overlap this SPA, all direct effects on habitat will occur entirely outside of the SPA, i.e., all direct effects assessed here relate to ex situ habitats which may support the herring gull SCI of The Murrough SPA.

1295. As the operation and maintenance phase progresses through its planned duration of 25 years, the above sea level spatial extent of infrastructure will at no point exceed 0.005 km^2 within the array site (i.e., combined sea level area of all turbines and OSSs). This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets to the herring gull SCI of The Murrough SPA: the array site

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1296. In relation to these Conservation Objective attributes, the footprint of operational infrastructure within the CWP Project array site may reduce the marine areas in which individuals can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of operation and maintenance phase activities within the array site may affect the energetic costs of non-foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

1297. Despite the above potential pathways to impact, these direct effects on habitat do not affect any area of the SPA (and hence do not affect the distribution of non-foraging habitat of this SCI within the SPA). Further, the area of habitat loss represents a negligible proportion of sea area within wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

1298. In the context of the extent of available habitat within foraging range of the SPA, and the negligible proportion that will be occupied by operational infrastructure, the scale of direct effects on habitat within the array site is considered to be negligible. In particular, the reduction in marine areas in which to undertake non-foraging behaviours, or requirement to use alternative areas for non-foraging behaviours, is not expected to give rise to energetic costs of non-foraging behaviours in such a way as to affect the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the non-breeding population abundance of the herring gull SCI of The Murrough SPA. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of the herring gull SCI of The Murrough SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to The Murrough SPA.

the array site Proposed mitigation

1299. No specific mitigation is proposed or required in respect of direct effects on habitat during the operation and maintenance phase within the array site, as this impact will not give rise to any AESI in relation to The Murrough SPA.

Residual effect

1300. As per project-only assessment, above.

OECC intertidal landfall

Project-only assessment

1301. Given the proximity of The Murrough SPA to South Dublin Bay, herring gull which utilise habitats within The Murrough SPA, may also over the course of the non-breeding period, use intertidal areas within South Dublin Bay and, as such may experience direct effects on ex situ habitat from operation and maintenance phase activities within this area.

1302. Impacts considered to be direct effects on habitat may arise as a consequence of maintenance activities which temporarily remove or alter areas of intertidal habitat which are utilised by this SCI in ex situ areas of South Dublin Bay. Cable landfall duct maintenance activities and potential cable repair works during the operation and maintenance phase within South Dublin Bay have the potential to alter areas of intertidal habitat such that they become temporarily unavailable to herring gull connected with The Murrough SPA, which may otherwise utilise those areas for ex situ non-foraging behaviours.

1303. This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for the herring gull SCI of The Murrough SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1304. In relation to these Conservation Objective attributes, operation and maintenance of the CWP Project OECC intertidal landfall may reduce the intertidal areas within South Dublin Bay in which individuals connected with The Murrough SPA can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of operation and

maintenance phase activities within the OECC intertidal landfall may directly affect demographic parameters (for example, use of alternative roosting areas may increase vulnerability to predation and reduce survival rates), or may affect the energetic costs of non-foraging behaviours through increased occupancy of sub-optimal area and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

1305. Despite the above potential pathways to impact, these direct effects on habitat do not affect any area within The Murrough SPA (and hence do not affect the distribution of non-foraging habitat of this SCI within the SPA). Furthermore, given the separation distance between this SPA and the OECC intertidal landfall (a minimum straight-line distance of 22.87 km and 'by-sea' distance of 23.77 km), only a minimal number of individuals connected with The Murrough SPA are likely to be using impacted areas within South Dublin Bay for non-foraging behaviours at any given time. Accordingly, the numbers of such individuals expected to experience direct effect on habitat impacts from operation and maintenance phase activities at the OECC intertidal landfall is considered negligible. As such, the potential for direct effects on habitat impacts at the OECC intertidal landfall affecting The Murrough SPA herring gull population is *de minimis*. Accordingly, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the wintering population abundance of the herring gull SCI of The Murrough SPA. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of the herring gull SCI of The Murrough SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to The Murrough SPA.

Proposed mitigation

1306. No specific mitigation is proposed or required in respect of direct effects on habitat during operation and maintenance within the OECC intertidal landfall, as this impact will not give rise to any AESI in relation to The Murrough SPA.

Residual effect

1307. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1308. The Conservation Objective and its attributes and targets for the herring gull SCI of The Murrough SPA are presented in **Table 2-22**. With regards to direct effects on habitat impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for The Murrough SPA herring gull SCI.**

Operation and maintenance phase impact 2 – Disturbance and displacement

OECC (Intertidal landfall)

Project-only assessment

1309. As the OECC intertidal landfall does not overlap this SPA and the SPA is beyond the extent of areas in which disturbance and displacement impacts are considered to occur surrounding operation and maintenance phase activities at the OECC intertidal landfall, all disturbance and displacement impacts will occur entirely outside of the SPA, i.e., all disturbance and displacement impacts assessed here relate to ex situ habitats which may support the herring gull SCI of The Murrough SPA.

1310. Herring gull which winter within The Murrough SPA may also utilise ex situ intertidal areas within South Dublin Bay and, as such, may experience disturbance and displacement impacts in relation to operation and maintenance phase activities at the OECC intertidal landfall within South Dublin Bay.

1311. Such ex situ disturbance and displacement impacts have the potential to affect the following Conservation Objective attributes and targets for the herring gull SCI of The Murrough SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1312. In relation to these Conservation Objective attributes, disturbance leading to temporary displacement of herring gull from ex situ intertidal habitats around operation and maintenance phase activity at the OECC intertidal landfall may lead to the temporary and localised exclusion of individuals from areas of habitat which would otherwise be used for foraging or other behaviours (i.e., temporary indirect habitat loss).

1313. Temporary localised reductions in the extent of ex situ intertidal habitat areas in which individuals can undertake foraging and non-foraging behaviours, which may require individuals to use alternative areas for such behaviours, may affect the energetic costs of those behaviours and, in turn, affect the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

1314. Despite the above potential pathways to impact, given the separation distance between this SPA and the OECC intertidal landfall (a minimum straight-line distance of 22.87 km and 'by-sea' distance of 23.77 km), only a minimal number of individuals connected with The Murrough SPA are likely to be using impacted areas within South Dublin Bay at any given time. Accordingly, the numbers of such individuals expected to experience disturbance and displacement impacts from operation and maintenance phase activities at the OECC intertidal landfall is considered negligible. As such, the potential for disturbance and displacement impacts at the OECC intertidal landfall affecting The Murrough SPA herring gull population is de minimis. Accordingly, the level of impact is not considered capable of resulting in a significant decline in the wintering population abundance of the herring gull SCI of The Murrough SPA. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of the herring gull SCI of The Murrough SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to The Murrough SPA.

Proposed mitigation

1315. No specific mitigation is proposed or required in respect of disturbance and displacement during operation and maintenance phase activities at the OECC intertidal landfall, as this impact will not give rise to any AESI in relation to The Murrough SPA.

Residual effect

1316. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1317. The Conservation Objective and its attributes and targets for the herring gull SCI of The Murrough SPA are presented in **Table 2-22**. With regards to disturbance and displacement impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for The Murrough SPA herring gull SCI.**

Operation and maintenance phase impact 3 – Changes in prey availability

Array site

Project-only assessment

1318. As the array site does not overlap this SPA and the SPA is beyond the range in which prey species may experience potential impacts from operation and maintenance phase activities, potential changes in prey availability impacts will occur entirely outside of the SPA, i.e., all impacts assessed here relate to prey species within ex situ habitats which may support the herring gull SCI of The Murrough SPA.

1319. Herring gull is a generalist and opportunist forager, whose diet comprises a range of fish and invertebrate species, as well as carrion and refuse. Operation and maintenance phase activities within the array site which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for the herring gull SCI of The Murrough SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1320. In relation to these Conservation Objective attributes, maintenance activities during the operational phase of the CWP Project array site may impact herring gull prey species through underwater noise effects, increases to suspended sediment concentrations, removal or alteration of important benthic habitats for herring gull prey species, or electromagnetic field effects affecting prey species distributions around electrical infrastructure. Should these impacts to prey species reduce the availability of those prey species to foraging herring gull, this may result in effects to the demographic parameters, and resultant population dynamics, of this SCI through processes such as increased energetic consequences of foraging reducing individual condition and survival rates. These potential consequences may compromise the ability of the SCI to maintain its population, with prey availability changes potentially resulting in there being insufficient habitat to support the SCI's population on a long-term basis.

1321. As operational phase activities within the array site will not include piling works or any other very high energy underwater noise inducing activities, and operational noise impact magnitudes to all potential prey species are assessed to be very low, there is not considered to be a pathway for operation and maintenance phase underwater noise impacts to have the potential to cause perceptible changes to prey availability in such a way that could impact this SCI.

1322. Similarly, as operational phase activities within the array site do not routinely require disturbance of the seabed (in the form of trenching or dredging activities) except within localised areas in which this is necessary to facilitate repairs, increased SSC levels, are considered to occur only potentially infrequently and locally during the operational phase and there is no perceptible pathway for this impact to have the potential to cause changes to prey availability during the operational phase in such a way that could impact this SCI.

1323. As herring gull is a generalist forager, although potential prey species are anticipated to experience the loss of up to 0.49 km^2 of previously available benthic habitat within the array site as a result of occupancy of the seabed by infrastructure during the operation and maintenance phase of the CWP Project, the loss of previously available benthic habitat impacts to herring gull prey species are not considered to have potential to result in population level consequences to herring gull on account of the high-level of dietary flexibility demonstrated by this SCI. The spatial extent of such prey species habitat loss is, considered to be of negligible size in relation to this SCI's breeding and non-breeding season range extents.

1324. During the operation and maintenance phase, one additional potential impact to seabird receptor prey species which does not occur during the construction phase is considered, namely EMF effects, associated with electricity passing along infrastructure cables. Any effects on fish are anticipated to occur within the immediate vicinity of the cable and effect levels are likely to be low in relation to background levels associated with the Earth's magnetic field. The magnitude of such impacts to potentially sensitive fish species are assessed as being very low. Consequently, there is not considered to be a pathway for operation and maintenance phase EMF impacts to have the potential to cause impacts to prey availability in such a way that could impact this SCI.

1325. Despite the above potential pathway to impact in the form of benthic habitat loss, the area in which impacts to prey species availability may occur represents a negligible proportion of sea area within the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

1326. In the context of the extent of available habitat within foraging range of the SPA, the negligible proportion of that habitat in which potential impacts to prey species may occur, and that potential impacts to prey species may be of limited (if any) demographic consequence to their seabird predators, the scale of changes in prey availability impacts associated with operation and maintenance phase activities within the array site is considered to be negligible.

1327. In particular, potential changes to prey availability resultant from operation and maintenance phase activities within the array site are not expected to perceptibly increase the energetic costs of foraging, or lead to reductions in individual condition or survival rates for the herring gull SCI of The Murrough SPA in such a way as to affect demographic parameters. Accordingly, the level of impact is not considered capable of altering the availability of herring gull prey species in such a way as to result in a significant decline in the breeding population abundance of the herring gull SCI of The Murrough SPA. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of the herring gull SCI of The Murrough SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to The Murrough SPA.

Proposed mitigation

1328. No specific mitigation is proposed or required in respect of changes in prey availability during the operation and maintenance phase within the array site, as this impact will not give rise to any AESI in relation to The Murrough SPA.

Residual effect

1329. As per project-only assessment, above.

OECC

Project-only assessment

1330. As the OECC does not overlap this SPA and the SPA is beyond the range in which prey species may experience potential impacts from operation and maintenance phase activities, potential changes in prey availability impacts will occur entirely outside of the SPA, i.e., all impacts assessed here relate to prey species within ex situ habitats which may support the herring gull SCI of The Murrough SPA.

1331. Herring gull is a generalist and opportunist forager, whose diet comprises a range of fish and invertebrate species, as well as carrion and refuse. Operation and maintenance phase activities within the OECC which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for the herring gull SCI of The Murrough SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1332. In relation to these Conservation Objective attributes, operation and maintenance phase activities within the CWP Project OECC may impact herring gull prey species through underwater noise effects, increases to suspended sediment concentrations, removal or alteration of important benthic habitats for those prey species, or electromagnetic field effects affecting prey species distributions around electrical infrastructure. Should these impacts to prey species reduce the availability of those prey species to foraging herring gull, this may result in effects to the demographic parameters, and resultant population dynamics, of this SCI through processes such as increased energetic consequences of foraging reducing individual condition and survival rates. These potential consequences may compromise the ability of the SCI to maintain its population, with prey availability changes potentially resulting in there being insufficient habitat to support the SCI's population on a long-term basis.

1333. As operational phase activities within the OECC do not include piling works or any other very high energy underwater noise inducing activities, and operational noise impact magnitudes to all potential prey species are assessed to be very low, there is not considered to be a pathway for operation and maintenance phase underwater noise impacts to have the potential to cause perceptible changes to prey availability in such a way that could impact this SCI.

1334. Similarly, as operational phase activities within the OECC do not routinely require disturbance of the seabed (in the form of trenching or dredging activities) except within localised areas in which this is necessary to facilitate repairs, increased SSC levels, are considered to occur only potentially infrequently and locally during the operational phase and there is no perceptible pathway for this impact to have the potential to cause changes to prey availability during the operational phase in such a way that could impact this SCI.

1335. As herring gull is a generalist forager, although potential prey species are anticipated to experience the loss of up to 0.11 km^2 of previously available benthic habitat within the OECC as a result of occupancy of the seabed by infrastructure during the operation and maintenance phase of the CWP Project, the loss of previously available benthic habitat impacts to herring gull prey species are not considered to have potential to result in population level consequences to herring gull on account of the high-level of dietary flexibility demonstrated by this SCI. The spatial extent of such prey species habitat loss is, considered to be of negligible size in relation to this SCI's non-breeding season range extents.

1336. During the operation and maintenance phase, one additional potential impact to seabird receptor prey species which does not occur during the construction phase is considered, namely EMF effects, associated with electricity passing along infrastructure cables. Any effects on fish are anticipated to occur within the immediate vicinity of the cable and effect levels are likely to be low in relation to background levels associated with the Earth's magnetic field. The magnitude of such impacts to potentially sensitive fish species are assessed as being very low. Consequently, there is not considered to be a pathway for operation and maintenance phase EMF impacts to have the potential to cause impacts to prey availability in such a way that could impact this SCI.

1337. Despite the above potential pathway to impact in the form of benthic habitat loss, the area in which impacts to prey species availability may occur represents a negligible proportion of sea area within the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

1338. In the context of the extent of available habitat within foraging range of the SPA, the negligible proportion of that habitat in which potential impacts to prey species may occur, and that potential impacts to prey species may be of limited (if any) demographic consequence to their seabird predators, the scale of changes in prey availability impacts associated with operation and maintenance phase activities within the OECC is considered to be negligible.

1339. In particular, potential changes to prey availability resultant from operation and maintenance phase activities within the OECC are not expected to perceptibly increase the energetic costs of foraging, or lead to reductions in individual condition or survival rates for the herring gull SCI of The Murrough SPA in such a way as to affect demographic parameters. Accordingly, the level of impact is not considered capable of altering the availability of herring gull prey species in such a way as to result in a significant decline in the wintering population abundance of the herring gull SCI of The Murrough SPA. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of the herring gull SCI of The Murrough SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to The Murrough SPA.

Proposed mitigation

1340. No specific mitigation is proposed or required in respect of changes in prey availability during the operation and maintenance phase within the OECC, as this impact will not give rise to any AESI in relation to The Murrough SPA.

Residual effect

1341. As per project-only assessment, above.

OECC intertidal landfall

Project-only assessment

1342. Herring gull which winter within The Murrough SPA may utilise intertidal areas within South Dublin Bay for foraging. Changes to prey availability from operation and maintenance phase activity for the OECC intertidal landfall may arise as a consequence of activities which temporarily remove or alter areas of intertidal prey species habitat, or otherwise alter conditions so as to reduce foraging efficiency. Specifically, cable landfall duct maintenance and other activities which may require localised excavations during the operation and maintenance phase within South Dublin Bay have the potential to affect areas of intertidal habitat such that prey species availability to herring gull is temporarily reduced within those areas.

1343. This change in prey species availability has the potential to impact on the following Conservation Objective attributes and targets for the herring gull SCI of The Murrough SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1344. In relation to these Conservation Objective attributes, operation and maintenance of the CWP Project OECC intertidal landfall may temporarily reduce the intertidal areas within South Dublin Bay in which individuals connected with The Murrough SPA can undertake foraging behaviours or require individuals to use alternative areas for foraging. These potential consequences of operation and maintenance phase activities within the OECC intertidal landfall may directly affect demographic parameters (for example, use of alternative foraging areas may affect the energetic costs of foraging behaviours through increased occupancy of sub-optimal foraging habitats and in turn the condition of individuals and their consequent survival and / or productivity rates), and thereby compromise the ability of the SCI to maintain its population.

1345. Despite the above potential pathways to impact, these changes in prey availability do not affect any area within The Murrough SPA (and hence do not affect the distribution of foraging habitat of this SCI within the SPA). Furthermore, given the separation distance between this SPA and the OECC intertidal landfall (a minimum straight-line distance of 22.87 km and 'by-sea' distance of 23.77 km), only a minimal number of individuals connected with The Murrough SPA are likely to be using impacted areas within South Dublin Bay for foraging behaviours at any given time. Accordingly, the numbers of such individuals expected to experience changes in prey availability impacts from operation and maintenance phase activities at the OECC intertidal landfall is considered negligible. As such, the potential for changes in prey availability impacts at the OECC intertidal landfall affecting The Murrough SPA herring gull population is *de minimis*. Accordingly, the level of impact is not considered capable of altering the extent of prey availability in such a way as to result in a significant decline in the wintering population abundance of the herring gull SCI of The Murrough SPA. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of the herring gull SCI of The Murrough SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to The Murrough SPA.

Proposed mitigation

1346. No specific mitigation is proposed or required in respect of changes in prey availability during operation and maintenance within the OECC intertidal landfall, as this impact will not give rise to any AESI in relation to The Murrough SPA.

Residual effect

1347. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1348. The Conservation Objective and its attributes and targets for the herring gull SCI of The Murrough SPA are presented in **Table 2-22**. With regards to changes in prey availability impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for The Murrough SPA herring gull SCI.**

Operation and maintenance impact 4 – Collision

Array site

Project-only assessment

1349. During the operation and maintenance phase of the CWP Project the presence of operational WTGs within the array site may result in the mortality of this SPA SCI through the collision of individuals with turbine blades. Collision mortality has the potential to impact on the following Conservation Objective attribute and target for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats

1350. Herring gull from The Murrough SPA may pass through the array site during the non-breeding period (when the herring gull population of the SPA forms the basis of the site's designation for this SCI) and, as such, may collide with operational WTGs.

1351. However, The Murrough SPA non-breeding season herring gull population constitutes only a negligible proportion of the regional herring gull non-breeding season population. The 10-year mean peak count of herring gull over the 2011/12 to 2020/21 non-breeding seasons from the North Wicklow Coastal Marshes I-WeBS survey site (which corresponds with the onshore part of The Murrough SPA) is 95 individuals. This equates to 0.05% of the regional herring gull non-breeding population (calculated as 187,090 individuals in **Appendix B** of **Technical Appendix 10.5: Baseline Characterisation Report** of the EIAR). As such, only a very small proportion of total non-breeding season herring gull predicted collision mortalities (0.05% of 2.393 = 0.001 collisions per non-breeding period - **Technical Appendix 10.3: Collision Risk Modelling** of the EIAR) would be considered to relate to individuals associated with The Murrough SPA.

1352. As additional mortality to this SPA SCI resulting from collision with operational WTGs is estimated to represent only a negligible potential increase to SPA baseline mortality rates, this impact is considered not to impede the overall objective of maintaining / restoring the favourable conservation condition of the SPA SCI. Specifically, collision mortality will not affect the population dynamics of the SCI in such a way as to compromise its ability to maintain itself on a long-term basis as a viable component of its natural habitats. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

1353. No specific mitigation is proposed, or required, in respect of collision during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1354. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1355. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-22**. With regards to collision impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

2.5.2 Receptor 2: Black-headed gull

Construction Phase Impacts

Construction phase impact 1 – Direct effects on habitat

Array site

Project-only assessment

1356. With regards to the array site, relevant construction phase direct effects on habitat relate to the alteration of sea surface areas as they become occupied by the footprint of installed infrastructure and, therefore, unavailable for use by seabird SCIs to undertake non-foraging behaviours.

1357. As construction of the array site progresses through its planned duration of approximately 2.5 years, the above sea level spatial extent of infrastructure will increase to a maximum of less than 0.005 km^2 within the array site (i.e., combined sea level area of all WTGs and OSSs). This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1358. In relation to these Conservation Objective attributes, construction within the array site may reduce the marine areas in which individuals can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of construction phase activities within the array site may affect the energetic costs of non-foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

1359. Given its designation as a wintering feature, the black-headed gull SCI of The Murrough SPA is not functionally connected to the array site, i.e., it is not a central-place forager during the non-breeding period. Non-breeding season black-headed gulls are more widely dispersed within the marine environment, utilising a significantly larger regional extent of sea area than during the breeding season. The spatial extent of less than 0.005 km^2 of above sea level infrastructure within the array area represents a tiny proportion of the marine areas utilised by this receptor during the non-breeding period.

1360. In the context of the area of available habitat, and the negligible area that will be lost within the array site during construction, the scale of direct effects on habitat within the array site is considered to be negligible.

1361. When considering the Conservation Objectives it is assessed that there will be no potential for construction phase direct effects on habitat to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

1362. No specific mitigation is proposed, or required, in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1363. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

1364. Black-headed gull which utilise habitats within The Murrough SPA, may also use intertidal areas within South Dublin Bay and as such may experience direct effects on habitat from construction phase activities within this area. However, South Dublin Bay, where the OECC intertidal landfall will be sited, is located 22.87 km from the Murrough SPA. The potential for impacts within this area affecting The Murrough SPA population or range of black-headed gull is therefore considered to be limited.

1365. Nevertheless, impacts considered to be ex situ direct effects on habitat may arise as a consequence of activities which temporarily disturb areas of intertidal habitat which are utilised by ornithological SCIs. There is no ex situ or in situ direct loss or removal of intertidal habitat proposed by the CWP project. Ex situ direct effects to intertidal areas which may be utilised by birds for non-foraging behaviours (such as roosting, loafing and maintenance) are considered only to relate to the physical footprint of the proposed intertidal infrastructure and works (i.e., the intertidal cable route during construction and any infrastructure at the proposed landfall location).

1366. Ex situ direct effects on intertidal habitat have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1367. In relation to these Conservation Objective attributes, construction in the OECC landfall area may temporarily reduce the areas in which individuals can undertake non-foraging behaviours (such as roosting) or require individuals to use alternative areas for these non-foraging behaviours. These impacts may affect energetic costs of non-foraging behaviours, which may in turn affect condition of individuals and survival rates.

1368. There will be no in situ direct effects on The Murrough SPA, the following analysis considers ex situ interactions in the South Dublin Bay and River Tolka Estuary SPA which may be utilised by this SPA SCI as a component of its broader natural range. The spatial extent of intertidal habitat within South Dublin Bay and River Tolka Estuary SPA, is 21.94 km^2. Approximately 0.16 km^2 of intertidal habitat within South Dublin Bay is estimated to be subject to direct effects as a result of intertidal cable landfall activities (0.04 km^2 from open cut landfall cable duct installation, 0.006 km^2 from cofferdam installation, and 0.11 km^2 from cable laying activities in the transition zone). This equates to approximately 0.72% of the total intertidal habitat area within the South Dublin Bay and River Tolka Estuary SPA being subject to temporary direct effects on habitat during the construction phase of the proposed intertidal landfall works.

1369. Following the backfilling of any excavated sections of trenching and removal of any supporting vehicles and / or infrastructure, it is considered that the re-establishment of intertidal habitat available to birds for non-foraging activities would occur rapidly due to the dynamic nature of intertidal habitats within South Dublin Bay. Any effects on the physical habitat around active intertidal construction loci would be brief, lasting less than several tidal cycles. Intertidal mudflats are considered resilient to isolated physical disturbances and can recover well (OSPAR, 2023).

1370. The total area anticipated to be subject to temporary direct effects on habitat during the construction phase of the proposed intertidal landfall works equates to 0.72% of the intertidal SPA habitat available to black-headed gulls. Given this proportion will be even smaller at any given moment in time during trenching activities, and given the rate of recoverability of available habitat following backfilling and removal of supporting infrastructure and / or vehicles, there will be no potential for construction phase disturbance and displacement impacts to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI.

1371. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

1372. No specific mitigation is proposed, or required, in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1373. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1374. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-22**. With regards to direct effects on habitat impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Construction phase impact 2 – Disturbance and displacement

OECC (Intertidal landfall)

Project-only assessment

1375. As the OECC intertidal landfall does not overlap this SPA and the SPA is beyond the extent of areas in which disturbance and displacement impacts are considered to occur surrounding construction phase works for the OECC intertidal landfall all disturbance and displacement impacts will occur entirely outside of the SPA, i.e., all disturbance and displacement impacts assessed here relate to ex situ habitats which may support the black-headed gull SCI of The Murrough SPA.

1376. Black-headed gull which utilise habitats within The Murrough SPA, may also use ex situ intertidal areas at the OECC intertidal landfall within South Dublin Bay or surrounding areas during migratory periods or between site movements during the non-breeding period and, as such, may experience disturbance and displacement impacts in relation to construction phase activities at the OECC intertidal landfall within South Dublin Bay.

1377. Such ex situ disturbance and displacement impacts have the potential to affect the following Conservation Objective attributes and targets for the black-headed gull SCI of The Murrough SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1378. In relation to these Conservation Objective attributes, disturbance leading to temporary displacement of black-headed gull from ex situ intertidal habitats around construction activity within at the OECC intertidal landfall may lead to the temporary and localised exclusion of individuals from areas of habitat which would otherwise be used for foraging or other behaviours (i.e. temporary indirect habitat loss).

1379. Temporary localised reductions in the extent of ex situ intertidal habitat areas in which individuals can undertake foraging and non-foraging behaviours, which may require individuals to use alternative areas for such behaviours, may affect the energetic costs of those behaviours and, in turn, affect the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

1380. Despite the above potential pathways to impact, given the separation distance between this SPA and the OECC intertidal landfall (a minimum straight-line distance of 22.87 km and 'by-sea' distance of 23.77 km), only a minimal number of individuals connected with The Murrough SPA are likely to be using impacted areas within South Dublin Bay at any given time. Accordingly, the numbers of such individuals expected to experience disturbance and displacement impacts from construction phase activities at the OECC intertidal landfall is considered negligible. As such, the potential for disturbance and displacement impacts at the OECC intertidal landfall affecting The Murrough SPA black-headed gull population is *de minimis*. Accordingly, the level of impact is not considered capable of resulting in a significant decline in the non-breeding population abundance of the black-headed gull SCI of The Murrough SPA. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of the black-headed gull SCI of The Murrough SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to The Murrough SPA.

Proposed mitigation

1381. No specific mitigation is proposed, or required, in respect of disturbance and displacement during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1382. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1383. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-22**. With regards to disturbance and displacement during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Construction phase impact 3 – Changes in prey availability

Array site and OECC

Project-only assessment

1384. Changes in prey availability has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1385. Black-headed gull is a generalist and opportunist forager, whose diet comprises a range of fish and invertebrate species, as well as carrion and refuse. Although fish species (including gadoids, sprats and sandeels) are anticipated to be impacted by underwater noise during the construction phase, these species are not considered to form a key part of the black-headed gull's diet.

1386. Mortality or injury-inducing underwater noise impacts to gadoids, sprats and sandeels (primarily in relation to pile driving for WTG and OSS foundation installation, and also UXO) are therefore not considered to have potential to result in population level consequences to black-headed gull.

1387. In relation to these Conservation Objective attributes, there will be no potential for changes in prey availability during the construction phase to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI.

1388. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

1389. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1390. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

1391. Black-headed gull which utilise habitats within The Murrough SPA may also use intertidal areas within South Dublin Bay and as such may experience changes in prey availability impacts from construction phase activities within this area. However, South Dublin Bay, where the OECC intertidal landfall will be sited, is located 22.87 km from the Murrough SPA. The potential for impacts within this area affecting The Murrough SPA population or range of black-headed gull is therefore considered to be limited.

1392. Black-headed gull is a generalist and opportunist forager, whose diet comprises a range of fish and invertebrate species, as well as carrion and refuse. Although fish species (including gadoids, sprats and sandeels) are anticipated to be impacted by underwater noise during the construction phase, these species are not considered to form a key part of the black-headed gull's diet.

1393. Construction phase activities within the OECC intertidal landfall area which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1394. These Conservation Objective attributes have the potential to be impacted through a reduction in prey availability due to:

a. Increased suspended sediment levels may temporarily alter the distribution of fish and mobile invertebrate species should they respond to avoid areas of altered water column condition.

b. Alteration of habitats which support prey species may reduce the capacity of those habitats to hold or produce prey species, thereby reducing the abundance of prey available to foraging seabirds within and around impacted areas.

1395. The extent of intertidal areas (between MLWS and MHWS) within South Dublin Bay is approximately 21.94 km^2, within which approximately 0.16 km^2 (0.72%) are predicted to be disturbed during landfall cable installation (**Chapter 4: Project Description**; **Section 4.8**). As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during construction activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

1396. In relation to these Conservation Objective attributes, there will be no potential for changes in prey availability during the construction phase to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI.

1397. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

1398. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1399. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1400. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-22**. With regards to changes in prey availability during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and Maintenance Phase Impacts

Operation and maintenance impact 1 – Direct effects on habitat

Array site

Project-only assessment

1401. With regards to the array site, relevant operation and maintenance phase direct effects on habitat relate to the occupation of sea surface areas by the footprint of operational infrastructure and therefore become unavailable for use by seabird SCIs to undertake non-foraging behaviours. As the array site does not overlap this SPA, all direct effects on habitat will occur entirely outside of the SPA, i.e. all direct effects assessed here relate to ex situ habitats which may support this SPA SCI.

1402. As the operation and maintenance phase progresses through its planned duration of 25 years, the above sea level spatial extent of infrastructure will at no point exceed 0.005 km^2 within the array site (i.e., combined sea level area of all WTGs and OSSs). This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1403. In relation to these Conservation Objective attributes, the presence of built infrastructure following the removal of previously available habitat may reduce the marine areas in which individuals can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of the spatial footprint of operational infrastructure within the array site may affect the energetic costs of non-foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

1404. Despite the above potential pathways to impact, these direct effects on habitat do not affect any area of the SPA (and hence do not affect the distribution of foraging or roosting habitat of this SCI within the SPA).

1405. In the context of the extent of available habitat within foraging range of the SPA, and the negligible proportion that will be occupied by operational infrastructure, the scale of direct effects on habitat within the array site is considered to be negligible. Accordingly, the level of impact is not considered capable of altering the extent of available habitat in such a way as to impact the population size of this SPA SCI.

1406. In relation to these Conservation Objective attributes, there will be no potential for direct effects on habitat during the operation and maintenance phase to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI.

1407. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

1408. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1409. As per project-only assessment, above.

OECC (Intertidal landfall)

Project-only assessment

1410. Given the proximity of The Murrough SPA to South Dublin Bay, black-headed gull which utilise habitats within The Murrough SPA, may also over the course of the non-breeding period, use intertidal areas within South Dublin Bay and, as such may experience direct effects on ex situ habitat from operation and maintenance phase activities within this area.

1411. Impacts considered to be direct effects on habitat may arise as a consequence of maintenance activities which temporarily remove or alter areas of intertidal habitat which are utilised by this SCI in ex situ areas of South Dublin Bay. Cable landfall duct maintenance activities and potential cable repair works during the operation and maintenance phase within South Dublin Bay have the potential to alter areas of intertidal habitat such that they become temporarily unavailable to black-headed gull connected with The Murrough SPA, which may otherwise utilise those areas for ex situ non-foraging behaviours.

1412. This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for the black-headed gull SCI of The Murrough SPA:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1413. In relation to these Conservation Objective attributes, operation and maintenance of the CWP Project OECC intertidal landfall may reduce the intertidal areas within South Dublin Bay in which individuals

connected with The Murrough SPA can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of operation and maintenance phase activities within the OECC intertidal landfall may directly affect demographic parameters (for example, use of alternative roosting areas may increase vulnerability to predation and reduce survival rates), or may affect the energetic costs of non-foraging behaviours through increased occupancy of sub-optimal area and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

1414. Despite the above potential pathways to impact, these direct effects on habitat do not affect any area within The Murrough SPA (and hence do not affect the distribution of non-foraging habitat of this SCI within the SPA). Furthermore, given the separation distance between this SPA and the OECC intertidal landfall (a minimum straight-line distance of 22.87 km and 'by-sea' distance of 23.77 km), only a minimal number of individuals connected with The Murrough SPA are likely to be using impacted areas within South Dublin Bay for non-foraging behaviours at any given time. Accordingly, the numbers of such individuals expected to experience direct effect on habitat impacts from operation and maintenance phase activities at the OECC intertidal landfall is considered negligible. As such, the potential for direct effects on habitat impacts at the OECC intertidal landfall affecting The Murrough SPA black-headed gull population is *de minimis*. Accordingly, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the wintering population abundance of the black-headed gull SCI of The Murrough SPA. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of the black-headed gull SCI of The Murrough SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to The Murrough SPA.

Proposed mitigation

1415. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1416. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1417. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-22**. With regards to direct effects on habitat during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance phase impact 2 – Changes in prey availability

Array site and OECC

Project-only assessment

1418. Changes in prey availability has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1419. Black-headed gull is a generalist and opportunist forager, whose diet comprises a range of fish and invertebrate species, as well as carrion and refuse. Although fish species (including gadoids, sprats and sandeels) are anticipated to be impacted by underwater noise during the operation phase, these species are not considered to form a key part of the black-headed gull's diet.

1420. In relation to these Conservation Objective attributes, maintenance activities during the operational phase of the CWP Project array site and OECC may impact black-headed gull prey species through underwater noise effects, increases to suspended sediment concentrations, removal or alteration of important benthic habitats for those prey species, or electromagnetic field effects affecting prey species distributions around electrical infrastructure. Should these impacts to prey species reduce the availability of those prey species to foraging black-headed gulls, this may result in effects to the demographic parameters, and resultant population dynamics, of this SCI through processes such as increased energetic consequences of foraging reducing individual condition and survival or productivity rates, or reduced provisioning rates to offspring reducing productivity rates. These potential consequences may compromise the ability of the SCI to maintain its population, with prey availability changes potentially resulting in there being insufficient habitat to support the SCI's population on a long-term basis.

1421. As operational phase activities within the array site and OECC will not include piling works or any other very high energy underwater noise inducing activities, and operational noise impact magnitudes to all potential prey species are assessed to be very low, there is not considered to be a pathway for operation and maintenance phase underwater noise impacts to have the potential to cause perceptible changes to prey availability in such a way that could impact this SCI.

1422. Similarly, as operational phase activities within the array site do not routinely require disturbance of the seabed (in the form of trenching or dredging activities) except within localised areas in which this is necessary to facilitate repairs, increased SSC levels, are considered to occur only potentially infrequently and locally during the operational phase and there is no perceptible pathway for this impact to have the potential to cause changes to prey availability during the operational phase in such a way that could impact this SCI.

1423. prey species, upon which the SCI depredates, may experience the loss of up to 0.49 km^2 of previously available benthic habitat within the array site as a result of occupancy of the seabed by infrastructure during the operation and maintenance phase of the CWP Project. The spatial extent of such prey species habitat loss is, however, considered to be of negligible size in relation to this SCI's non-breeding season range extents.

1424. During the operation and maintenance phase, one additional potential impact to seabird receptor prey species which does not occur during the construction phase is considered, namely EMF effects, associated with electricity passing along infrastructure cables. Any effects on fish are anticipated to

occur within the immediate vicinity of the cable and effect levels are likely to be low in relation to background levels associated with the Earth's magnetic field. The magnitude of such impacts to potentially sensitive fish species are assessed as being very low. Consequently, there is not considered to be a pathway for operation and maintenance phase EMF impacts to have the potential to cause impacts to prey availability in such a way that could impact this SCI.

1425. In the context of the extent of available habitat within foraging range of the SPA, the negligible proportion of that habitat in which potential impacts to prey species may occur, and that potential impacts to prey species may be of limited (if any) demographic consequence to their seabird predators, the scale of changes in prey availability impacts associated with operation and maintenance phase activities within the array site and OECC is considered to be negligible.

1426. In relation to these Conservation Objective attributes, there will be no potential for changes in prey availability during the operation and maintenance phase to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI.

1427. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

1428. No specific mitigation is proposed, or required, in respect of disturbance and displacement during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1429. As per project only assessment, above.

OECC (Intertidal landfall)

Project only assessment

1430. Black-headed gull which utilise habitats within The Murrough SPA may also use intertidal areas within South Dublin Bay and, as such, may experience changes in prey availability impacts from operation and maintenance phase activities within this area. However, South Dublin Bay, where the OECC intertidal landfall will be sited, is located 22.87 km from the Murrough SPA and, as such, the potential for impacts within this area affecting The Murrough SPA population or range of black-headed gull is considered to be limited.

1431. Black-headed gull is a generalist and opportunist forager, whose diet comprises a range of fish and invertebrate species, as well as carrion and refuse.

1432. Changes in prey availability has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1433. These Conservation Objective attributes have the potential to be impacted through a reduction in prey availability due to:

a. Increased suspended sediment levels may temporarily alter the distribution of fish and mobile invertebrate species should they respond to avoid areas of altered water column condition.

b. Alteration of habitats which support prey species may reduce the capacity of those habitats to hold or produce prey species, thereby reducing the abundance of prey available to foraging seabirds within and around impacted areas.

1434. The extent of intertidal areas (between MLWS and MHWS) within South Dublin Bay is approximately 21.94 km^2, within which approximately 0.16 km^2 (0.72%) are predicted to be disturbed during landfall cable installation (**Chapter 4: Project Description**; **Section 4.8**). The scale of any maintenance to buried infrastructure carried out during the operation and maintenance phase will likely be considerably smaller than that during cable installation during the construction phase. As the total intertidal habitat available to foraging bird species is considerably larger than the area which may experience changes in prey availability during operation and maintenance activities, there will be large amounts of unaffected habitat for birds to utilise. Furthermore, there will be a high rate of recoverability of the impacted habitat (and associated organisms) and trenching activities are of a short-term nature.

1435. In relation to these Conservation Objective attributes, there will be no potential for changes in prey availability during the operation and maintenance phase to adversely affect the population or distributions of this SPA SCI in such a way as to result in AESI.

1436. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

1437. No specific mitigation is proposed, or required, in respect of disturbance and displacement during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1438. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1439. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-22**, above. With regards to changes in prey availability during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance impact 3 – Collision

Project-only assessment

1440. During the operation and maintenance phase of the CWP Project the presence of operational WTGs within the array site may result in the mortality of this SPA SCI through the collision of individuals with turbine blades. Collision mortality has the potential to impact on the following Conservation Objective attribute and target for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats.

1441. In relation to this Conservation Objective attribute, mortality resultant from collision with operational WTGs within the array site may directly affect the overall survival rate of this SPA SCI. This potential consequence may compromise the ability of the SCI to maintain its population on a long-term basis.

1442. Flight activity by this SCI recorded within the array site during baseline surveys was extremely low throughout the baseline survey period (**Appendix 10.5: Baseline Characterisation Report** of the EIAR). Consequently, CRM has not been undertaken for this species on the basis that flight densities within the array site are extremely low and that resultant mortality rates to this SCI would be negligible.

1443. As additional mortality to this SPA SCI resulting from collision with operational WTGs is estimated to represent only a negligible potential increase to SPA baseline mortality rates, this impact is considered not to impede the overall objective of maintaining / restoring the favourable conservation condition of the SPA SCI. Specifically, collision mortality will not affect the population dynamics of the SCI in such a way as to compromise its ability to maintain itself on a long-term basis as a viable component of its natural habitats. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

1444. No specific mitigation is proposed, or required, in respect of collision during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1445. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1446. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-22**. With regards to collision impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

2.5.3 Receptor 3: Red-throated diver

Construction Phase Impacts

Construction phase impact 1 – Direct effects on habitat

Array site

Project-only assessment

1447. With regards to the array site, relevant construction phase direct effects on habitat relate to the alteration of sea surface areas as they become occupied by the footprint of installed infrastructure and, therefore, unavailable for use by seabird SCIs to undertake non-foraging behaviours.

1448. As construction of the array site progresses through its planned duration of approximately 2.5 years, the above sea level spatial extent of infrastructure will increase to a maximum of less than 0.005 km^2 within the array site (i.e., combined sea level area of all WTGs and OSSs). This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1449. In relation to these Conservation Objective attributes, construction within the array site may reduce the marine areas in which individuals can undertake foraging. These potential consequences of construction phase activities within the array site may affect the energetic costs of foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

1450. In the context of the area of available habitat within foraging range of the SPA, and the negligible proportion that will be lost within the array site during construction, the scale of direct effects on habitat within the array site is considered to be negligible. Accordingly, the level of impact is not considered capable of resulting in a significant decline in the population abundance or passage population of this SCI.

1451. Consequently, there is assessed to be no potential for AESI to result from direct effects on habitat during construction phase activities within the array site in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-22**.

Proposed mitigation

1452. No specific mitigation is proposed, or required, in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1453. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1454. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-22**. With regards to direct effects on habitat impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Construction phase impact 2 – Disturbance and displacement

Array site (Indirect habitat loss and barrier effects)

Project-only assessment

1455. Disturbance and displacement have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1456. Construction phase disturbance and displacement impacts to the red-throated diver SCI of The Murrough SPA from activities associated with the development of the array site may occur through distributional responses to vessel traffic within and around the array site, avoidance of areas around OWF as it is installed by birds on the sea surface or alteration of flightpaths by migrating or commuting individuals.

1457. Red-throated diver is widely recognised as being particularly sensitive to human activities in marine areas, including through the disturbance effects of vessel traffic and the presence of WTGs (Garthe and Hüppop 2004; Schwemmer et al., 2011; Furness and Wade 2012; Furness et al., 2013; Bradbury et al., 2014; Wade et al, 2016). However, studies to quantify displacement rates, distances at which displacement occurs, and consequences of displacement have documented a wide range of observed responses.

1458. The UK Statutory Nature Conservation Bodies (SNCBs) recommend the use of a 100% displacement rate to a 4 km buffer and a 10% mortality rate; or reduced displacement and mortality rates for buffers of up to 10 km (UK SNCBs, 2022). A review from the English southern North Sea for the Norfolk Vanguard OWF examination found the strongest evidence-led position to be a displacement rate of 90% affecting the array site and a 2 km buffer, and a 1% mortality rate of displaced birds (MacArthur Green, 2019). Additional evidence from UK OWFs that indicates displacement rates at such distances are considerably less than this (i.e., Webb et al. (2017) noted only a 34% decrease in population density at 8 km from Lynn and Inner Dowsing OWF).

1459. This lower mortality rate is also supported by a recent analysis of diver abundance in response to OWF development within the German North Sea (Vilela et al., 2020): despite regional scale expansion of OWFs, long-term population trends were assessed to be stable. By considering digital aerial survey data collected between 2001 and 2018, a period spanning prior to and during the expansion of OWFs within the German North Sea, the authors concluded that, despite notable distributional changes in response to OWF development, there was no significant trend in non-breeding population size of diver species (the large majority of which are red-throated diver) over that period. The absence of population change, derived from this large and long-term monitoring dataset is therefore indicative that the probability of individuals experiencing mortality or fitness effects from displacement leading to demographic consequences is very low, and provides support for a very low (i.e., 1%) displacement mortality rate to be used for OWF displacement impact assessment, rather than a high (i.e., 10%) displacement mortality rate.

1460. This is consistent with the position that, because red-throated diver utilise a range of marine habitats and prey species, and do not typically aggregate in high densities within marine foraging areas, they are unlikely to experience significant levels of increased density-dependant competition or interference as a result of redistribution in avoidance of OWFs (Diershke et al., 2017).

1461. From these reviews our view is that for a buffer of 10 km, using a displacement rate of 50% and a mortality rate of 1% would still be very precautionary.

1462. I-WeBS coverage of the North Wicklow Coastal Marshes, corresponding with the area of The Murrough SPA and available at Site Summary Tables_S27 (caspio.com)) provides a 10-year mean peak wintering count of red-throated diver of 74 individuals for the period 2011 / 12 to 2020 / 21, with peak counts occurring during December (which corresponds with the migration-free non-breeding period of red-throated diver).

1463. The minimum separation distance between the Murrough SPA and the array site is 7.50 km and 37.06% of The Murrough SPA lies within 10 km of the array site.

1464. If red-throated diver are assumed to be evenly distributed throughout the SPA and to experience displacement around OWF infrastructure to a distance of 10 km in accordance with UK Joint SNCB Interim Advice on the treatment of displacement for red-throated diver (UK SNCBs, 2022), up to 27.42 red-throated divers (37.06% of the 10-year mean peak) are predicted to occur within parts of the SPA within 10 km of the array site where they may experience potential displacement impacts.

1465. Therefore, it is conservatively assumed that 50% of red-throated divers are displaced from the area of The Murrough SPA between 7.5 km and 10 km from the array site, and that 1% of displaced birds experience mortality. Using this conservative approach the total predicted displacement mortality to The Murrough SPA associated with presence of turbine infrastructure within the array site is estimated to be 0.14 red-throated divers per migration-free breeding period.

1466. If the average mortality rate of red-throated diver is estimated to be 22.4% (as calculated from demographic parameters presented in Horswill and Robinson, 2015 – see **Section 10.6, Table 10-15** of EIAR), for The Murrough SPA 10-year mean-peak population of 74 individuals, the average annual baseline number of mortalities for the SPA population is calculated to be 16.58 individuals. An additional 0.14 mortalities resultant from displacement around the array site represents a 0.83% increase to the baseline mortality rate of the SPA.

1467. This modest increase to the baseline mortality rate does not constitute an AESI to the red-throated diver SCI of The Murrough in relation to the Conservation Objectives, attributes and targets outlined in **Table 2-22**.

1468. With regard to potential barrier effects to red-throated diver presented by the construction of standing infrastructure within the array site, flight densities observed within the array site and a surrounding 4 km buffer area during baseline surveys were extremely low (see **Technical Appendix 10.5: Baseline Characterisation Report** of the EIAR). Consequently, disturbance and displacement impacts resulting from barrier effects to the red-throated diver SCI of The Murrough SPA do not have the potential to result in AESI in relation to the Conservation Objectives, attributes and targets outlined in **Table 2-22**.

Proposed mitigation

1469. Despite disturbance and displacement impacts associated with construction phase activities within the array site not resulting in AESI to the red-throated diver SCI of The Murrough SPA, due to the proximity of the array site and OECC to the SPA (the latter overlapping a small area of the SPA over an area of 0.014km^2), additional mitigation in the form of protocols within an ecological vessel management plan will be implemented to further reduce potential vessel related disturbance to red-throated diver.

1470. These protocols shall include avoiding any non-essential vessel transits through The Murrough SPA where practicable and routing construction vessel movements to make preferential use of existing shipping lanes in order to minimise vessel activities outside of areas in which baseline levels of vessel transit are high.

Residual impacts

1471. As per project only assessment, above.

OECC (including intertidal landfall area)

Project-only assessment

1472. Disturbance and displacement have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1473. Construction phase disturbance and displacement impacts to the red-throated diver SCI of The Murrough SPA from activities associated with the development of the OECC may occur through distributional responses to vessel traffic within and around the OECC.

1474. Following an offshore expansion of The Murrough SPA in 2023, the OECC slightly overlaps the north-eastern corner of the revised SPA boundary, with a total of 0.014 km^2 within both the SPA and OECC. This equates to 0.04% of the OECC area (38.22 km^2) and 0.01% of The Murrough SPA area (97.69 km^2).

1475. From studies undertaken within the North and Baltic Seas (Fliessbach et al., 2019), almost all unidentified divers and divers identified as red-throated divers were observed to demonstrate escape responses (in the form of taking off) in response to approaching vessels. The mean distance at which these responses occurred was 1,374 m or 1,281 m for individual or groups of unidentified divers, respectively, and 750 m or 702 m for individual or groups identified as red-throated divers, respectively. The maximum distance at which these responses occurred (provided only in relation to individuals in Fliessbach et al., 2019) was 2,000 m for unidentified divers and 1,700 m for individuals identified as red-throated divers. The minimum distance at which these responses occurred (provided only in relation to individuals in Fliessbach et al., 2019) was 340 m for unidentified divers and 250 m for individuals identified as red-throated divers.

1476. On this basis, given the proximity of the overlap between the potential disturbance radii of vessels undertaking construction phase works within the OECC and The Murrough SPA, and making the conservative assumption to use the disturbance responses ranges from Fliessbach et al. (2019) of unidentified divers (except for minimum distances, where the value for identified red-throated divers is considered appropriate), it is estimated that:

- 6.69% (6.53 km^2) of the area of The Murrough SPA lies within the maximum range (2,000 m) of areas within the OECC in which vessels may undertake construction phase activities at which divers have been observed to demonstrate avoidance responses.
- 3.38% (3.30 km^2) of the area of the Murrough SPA lies within the mean range (1,374 m) of areas within the OECC in which vessels may undertake construction phase activities at which divers have been observed to demonstrate avoidance responses.
- 0.17% (0.17 km^2) of the area of the Murrough SPA lies within the minimum range (250 m) of areas within the OECC in which vessels may undertake construction phase activities at which divers have been observed to demonstrate avoidance responses.

1477. Furthermore, it should be noted that the eastern extent of the seaward expansion of The Murrough SPA and the OECC where it overlaps The Murrough SPA, and parts of the OECC within 2 km of The

Murrough SPA (i.e., within a distance at which red-throated divers within The Murrough SPA may theoretically undertake avoidance responses), all lie within an existing, busy shipping corridor on the southern approach to Dublin Port (**Chapter 16 Shipping and Navigation**). This shipping corridor is used by very large cargo vessels travelling between Dublin and a number of other ports (most notably Rotterdam), with average daily passage rates of approximately nine – 12 cargo vessels, in addition to additional fishing and recreational vessel traffic.

1478. Construction activities within the OECC are scheduled to be undertaken within a 27-month window, with cable installation activities occurring after preparation of the seabed within the OECC. Vessels undertaking seabed preparation activities and subsequent cable installation works will be present within the OECC and surrounding areas only during a limited proportion of the total scheduled OECC construction window.

1479. For each of the three export cables which are to be installed within the OECC, the estimated duration of installation works is 21 days, i.e., a total duration of all cable installation works for the OECC of 63 days. Within this period, assuming the majority of cables are installed using jet trenching or cable plough methods and associated indicative cable installation rates (summarised in **Table 4-11** of **Chapter 4 Project Description)**, the total cable installation period for all three cables within the OECC is estimated to be up to approximately 720 hours, with only a small proportion of this time being undertaken within the maximum red-throated diver avoidance response range (2,000 m) of The Murrough SPA.

1480. The maximum number of vessels active in association with cable installation activities within the OECC at any one time would be seven (548 round trips throughout the OECC area) during seabed preparation works (including Trailing Suction Hopper Dredger (TSHD) for sand wave clearance and disposal off site, Pre-Lay Grapnel Run (PLGR), Out Of Service removal, boulder clearance, pre-crossing protection and survey vessel) and five (37 round trips throughout the OECC area) during export cable installation works (including at landfall; and includes support, cable protection and anchor handling vessels).

1481. I-WeBS coverage of the North Wicklow Coastal Marshes, corresponding with the area of The Murrough SPA and available at Site Summary Tables_S27 (caspio.com)) provides a 10-year mean peak wintering count of red-throated diver of 74 individuals for the period 2011 / 12 to 2020 / 21, with peak counts occurring during December (which corresponds with the migration-free non-breeding period of red-throated diver). If red-throated diver are assumed to be evenly distributed throughout the SPA, this equates to up to 4.95, 2.50 and 0.13 individuals occurring within areas of the SPA within maximum, mean and minimum vessel avoidance response ranges of construction phase activity works within the OECC.

1482. Given the limited duration of potential disturbance impacts to a small potential number of individuals within a small part of the SPA, where baseline levels of vessel disturbance are already high and therefore some form of acclimatisation likely, the potential for construction phase activity within the OECC to cause meaningful additional displacement effects to the red-throated diver SCI of The Murrough SPA is assessed to be negligible. Therefore, there is no potential for such activities to result in AESI in relation to the Conservation Objectives and attributes and targets for these SCIs as stated in **Table 2-22**.

Proposed mitigation

1483. Despite disturbance and displacement impacts associated with construction phase activities within the OECC not resulting in AESI to the red-throated diver SCI of The Murrough SPA, due to the proximity of the array site and OECC to the SPA (the latter overlapping a small area of the SPA over an area of 0.014km^2), additional mitigation in the form of protocols within a construction phase ecological vessel

management plan will be implemented to minimise potential vessel related disturbance to red-throated diver.

1484. These protocols shall include avoiding any non-essential vessel transits through The Murrough SPA where practicable and routing construction vessel movements to make preferential use of existing shipping lanes in order to minimise vessel activities outside of areas in which baseline levels of vessel transit are high.

Residual impacts

1485. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1486. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-22**. With regards to disturbance and displacement during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Construction phase impact 3 – Changes in prey availability

Array site

Project-only assessment

1487. Changes in prey availability have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1488. Red-throated diver is a generalist and opportunist piscivore, whose diet comprises a range of fish species though potentially favouring pelagic schooling species that have a high energetic value (such as sprat and herring). Of its key prey species groups, sprat are anticipated to be most impacted by underwater noise during the construction phase.

1489. Mortality or injury-inducing underwater noise impacts to this group (primarily in relation to pile driving for WTG and OSS foundation installation over up to 262.5 days, over a period of up to 3 years) are calculated to occur within only very low proportions of theoretical red-throated diver non-breeding season range extent.

1490. Although TTS impacts are calculated to occur across a much greater than mortality or injury-inducing underwater noise impacts, it should be noted that TTS impacts to prey species are considered to have very limited potential to result in population level consequences to their seabird predators).

1491. The spatial extent of removed or altered of areas of benthic habitat during construction phase activities are also assessed to be of negligible size in relation to non-breeding season range extents.

1492. Consequently, there is assessed to be no potential for AESI to result from changes in prey availability during construction phase activities within the array site in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-22**.

Proposed mitigation

1493. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1494. As per project-only assessment, above.

OECC (including intertidal landfall area)

Project-only assessment

1495. Changes in prey availability have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1496. Red-throated diver is a generalist and opportunist piscivore, whose diet comprises a range of fish species though potentially favouring pelagic schooling species (such as sprat and herring) that have a high energetic value. Of its key prey species groups, sprat are anticipated to be most impacted by underwater noise during the construction phase. Mortality or injury inducing underwater noise impacts to this group (and to prey species more generally) are however anticipated to be very limited, as no pile driving activities are proposed in relation to the installation of the export cable within the OECC.

1497. Areas affected by increased SSC levels during construction phase activities are assessed to be of negligible size in relation to seabird non-breeding season range extents and occur over relatively short durations. Suspended sediment plumes created during dredge disposal operations within the OECC are predicted to enhance SSC levels over up to *c*. 4–5 km (depending on tidal conditions), for a duration of *c*.10 days and resulting in cumulative deposition thicknesses of *c*. 1 cm. Suspended sediment plumes created during trenching operations within the OECC are predicted to enhance SSC levels over up *c*. 7 km (depending on tidal conditions), for a duration of *c*. 10 days and resulting in cumulative deposition thicknesses of *c*. 1 cm.

1498. The spatial extent of removed or altered of areas of benthic habitat during construction phase activities are also assessed to be of negligible size in relation to seabird non-breeding season range extents, as the maximum potential extent of removed or altered benthic habitat within the OECC totals just 5.63 km^2.

1499. Consequently, there is assessed to be no potential for AESI to result from changes in prey availability during construction phase activities within the OECC in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-22**.

Proposed mitigation

1500. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1501. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1502. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-22**. With regards to changes in prey availability during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and Maintenance Phase Impacts

Operation and maintenance impact 1 – Direct effects on habitat

Array site

Project-only assessment

1503. With regards to the array site, relevant operation and maintenance phase direct effects on habitat relate to the occupation of sea surface areas by the footprint of operational infrastructure and unavailable for use by seabird SCIs to undertake non-foraging behaviours. As the array site does not overlap this SPA, all direct effects on habitat will occur entirely outside of the SPA, i.e., all direct effects assessed here relate to ex situ habitats which may support the red-throated diver SCI of The Murrough SPA.

1504. This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1505. In relation to these Conservation Objective attributes, the presence of operational infrastructure within the array site may reduce the marine areas in which individuals can undertake non-foraging behaviours. These potential consequences of the spatial footprint of operational infrastructure within the array site may affect the energetic costs of foraging behaviours and in turn the condition of individuals and their consequent survival; and thereby compromise the ability of the SCI to maintain its population.

1506. Despite the above potential pathways to impact, these direct effects on habitat do not affect any area of the SPA (and hence do not affect the distribution of non-foraging habitat of this SCI within the SPA). Further, the area of habitat loss represents a negligible proportion of sea area within wider Irish Sea

and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

1507. In the context of the extent of available habitat within foraging range of the SPA, and the negligible proportion that will be occupied by operational infrastructure, the scale of direct effects on habitat within the array site is considered to be negligible. In particular, the reduction in marine areas in which to undertake non-foraging behaviours, or requirement to use alternative areas for non-foraging behaviours, is not expected to give rise to energetic costs of non-foraging behaviours in such a way as to affect the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the non-breeding population abundance of the red-throated diver SCI of The Murrough SPA. The CWP Project will therefore not impede the overall objective of maintaining / restoring the favourable conservation condition of the red-throated diver SCI of The Murrough SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to The Murrough SPA.

Proposed mitigation

1508. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1509. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1510. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-22**. With regards to direct effects on habitat during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance impact 2 – Disturbance and displacement

Array site (indirect habitat loss and barrier effects)

Project-only assessment

1511. Disturbance and displacement have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1512. Operation and maintenance phase disturbance and displacement impacts to the red-throated diver SCI of The Murrough SPA from activities associated with the development of the array site may occur through distributional responses to vessel traffic within and around the array site, avoidance of areas

around OWF as it is installed by birds on the sea surface or alteration of flightpaths by migrating or commuting individuals.

1513. Red-throated diver is widely recognised as being particularly sensitive to human activities in marine areas, including through the disturbance effects of vessel traffic and the presence of WTGs (Garthe and Hüppop 2004; Schwemmer et al., 2011; Furness and Wade 2012; Furness et al., 2013; Bradbury et al., 2014; Wade et al, 2016). However, studies to quantify displacement rates, distances at which displacement occurs, and consequences of displacement have documented a wide range of observed responses.

1514. The UK Statutory Nature Conservation Bodies (SNCBs) recommend the use of a 100% displacement rate to a 4 km buffer and a 10% mortality rate; or reduced displacement and mortality rates for buffers of up to 10 km (UK SNCBs, 2022). A review from the English southern North Sea for the Norfolk Vanguard OWF examination found the strongest evidence-led position to be a displacement rate of 90% affecting the array site and a 2 km buffer, and a 1% mortality rate of displaced birds (MacArthur Green, 2019). Additional evidence from UK OWFs that indicates displacement rates at such distances are considerably less than this (i.e., Webb et al., 2017 noted only a 34% decrease in population density at 8 km from Lynn and Inner Dowsing OWF).

1515. This lower mortality rate is also supported by a recent analysis of diver abundance in response to OWF development within the German North Sea (Vilela et al., 2020): despite regional scale expansion of OWFs, long-term population trends were assessed to be stable. By considering digital aerial survey data collected between 2001 and 2018, a period spanning prior to and during the expansion of OWFs within the German North Sea, the authors concluded that, despite notable distributional changes in response to OWF development, there was no significant trend in non-breeding population size of diver species (the large majority of which are red-throated diver) over that period. The absence of population change, derived from this large and long-term monitoring dataset is therefore indicative that the probability of individuals experiencing mortality or fitness effects from displacement leading to demographic consequences is very low, and provides support for a very low (i.e., 1%) displacement mortality rate to be used for OWF displacement impact assessment, rather than a high (i.e., 10%) displacement mortality rate.

1516. This is consistent with the position that, because red-throated diver utilise a range of marine habitats and prey species, and do not typically aggregate in high densities within marine foraging areas, they are unlikely to experience significant levels of increased density-dependant competition or interference as a result of redistribution in avoidance of OWFs (Diershke et al., 2017).

1517. From these reviews our view is that for a buffer of 10 km, using a displacement rate of 50% and a mortality rate of 1% would still be very precautionary.

1518. I-WeBS coverage of the North Wicklow Coastal Marshes, corresponding with the area of The Murrough SPA and available at Site Summary Tables_S27 (caspio.com)) provides a 10-year mean peak wintering count of red-throated diver of 74 individuals for the period 2011 / 12 to 2020 / 21, with peak counts occurring during December (which corresponds with the migration-free non-breeding period of red-throated diver).

1519. The minimum separation distance between the Murrough SPA and the array site is 7.50 km and 37.06% of The Murrough SPA lies within 10 km of the array site.

1520. If red-throated diver are assumed to be evenly distributed throughout the SPA and to experience displacement around OWF infrastructure to a distance of 10 km in accordance with UK Joint SNCB Interim Advice on the treatment of displacement for red-throated diver (UK SNCBs, 2022), up to 27.42 red-throated divers (37.06% of the 10-year mean peak) are predicted to occur within parts of the SPA within 10 km of the array site where they may experience potential displacement impacts.

1521. Therefore, it is conservatively assumed that 50% of red-throated divers are displaced from the area of The Murrough SPA between 7.5 km and 10 km from the array site, and that 1% of displaced birds

experience mortality. Using this conservative approach the total predicted displacement mortality to The Murrough SPA associated with presence of turbine infrastructure within the array site is estimated to be 0.14 red-throated divers per migration-free breeding period.

1522. If the average mortality rate of red-throated diver is estimated to be 22.4% (as calculated from demographic parameters presented in Horswill and Robinson, 2015 – see **Section 10.6**, **Table 10-15** of EIAR), for The Murrough SPA 10-year mean-peak population of 74 individuals, the average annual baseline number of mortalities for the SPA population is calculated to be 16.58 individuals. An additional 0.14 mortalities resultant from displacement around the array site represents a 0.83% increase to the baseline mortality rate of the SPA.

1523. This modest increase to the baseline mortality rate does not constitute an AESI to the red-throated diver SCI of The Murrough in relation to the Conservation Objectives, attributes and targets outlined in **Table 2-22**.

1524. With regard to potential barrier effects to red-throated diver presented by the presence of standing infrastructure within the array site, flight densities observed within the array site and a surrounding 4 km buffer area during baseline surveys were extremely low (**Technical Appendix 10.5: Baseline Characterisation Report** of the EIAR). Consequently, disturbance and displacement impacts resulting from barrier effects to the red-throated diver SCI of The Murrough SPA do not have the potential to result in AESI in relation to the Conservation Objectives, attributes and targets outlined in **Table 2-22**.

Proposed mitigation

1525. Despite disturbance and displacement impacts associated with operation and maintenance phase activities within the array site not resulting in AESI to the red-throated diver SCI of The Murrough SPA, due to the proximity of the array site and OECC to the SPA (the latter overlapping a small area of the SPA over an area of 0.014km^2), additional mitigation in the form protocols within an operation and maintenance phase vessel management plan will be implemented to minimise potential vessel related disturbance to red-throated diver.

1526. These protocols shall include avoiding any non-essential vessel transits through The Murrough SPA where practicable and routing vessel movements to make preferential use of existing shipping lanes in order to minimise vessel activities outside of areas in which baseline levels of vessel transit are high.

Residual impacts

1527. As per project-only assessment, above.

OECC (including intertidal landfall area)

Project-only assessment

1528. Disturbance and displacement have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1529. Potential for disturbance and displacement within the OECC during the operational and maintenance phase of the project is limited to works associated with routine monitoring activity and maintenance or repair events over the operational lifetime of the project. During such activities, displacement and disturbance would potentially occur only within a limited range of any vessels involved.

1530. Following an offshore expansion of The Murrough SPA in 2023, the OECC slightly overlaps the north-eastern corner of the revised SPA boundary, with a total of 0.014 km^2 within both the SPA and OECC. This equates to 0.04% of the OECC area (38.22 km^2) and 0.01% of The Murrough SPA area (97.69 km^2).

1531. From studies undertaken within the North and Baltic Seas (Fliessbach et al., 2019), almost all unidentified divers and divers identified as red-throated divers were observed to demonstrate escape responses (in the form of taking flight) in response to approaching vessels. The mean distance at which these responses occurred was 1,374 m or 1,281 m for individual or groups of unidentified divers, respectively, and 750 m or 702 m for individual or groups identified as red-throated divers, respectively. The maximum distance at which these responses occurred (provided only in relation to individuals in Fliessbach et al., 2019) was 2,000 m for unidentified divers and 1,700 m for individuals identified as red-throated divers. The minimum distance at which these responses occurred (provided only in relation to individuals in Fliessbach et al., 2019) was 340 m for unidentified divers and 250 m for individuals identified as red-throated divers.

1532. On this basis, given the proximity of the overlap between the potential disturbance radii of vessels undertaking operation and maintenance works within the OECC and The Murrough SPA, and making the conservative assumption to use the disturbance responses ranges from Fliessbach et al., 2019, of unidentified divers (except for minimum distances, where the value for identified red-throated divers is considered appropriate), it is estimated that:

- 6.69% (6.53 km^2) of the area of The Murrough SPA lies within the maximum range (2,000 m) of areas within the OECC in which vessels may undertake operation and maintenance phase activities at which divers have been observed to demonstrate avoidance responses.
- 3.38% (3.30 km^2) of the area of the Murrough SPA lies within the mean range (1,374 m) of areas within the OECC in which vessels may undertake operation and maintenance phase activities at which divers have been observed to demonstrate avoidance responses.
- 0.17% (0.17 km^2) of the area of the Murrough SPA lies within the minimum range (250 m) of areas within the OECC in which vessels may undertake operation and maintenance phase activities at which divers have been observed to demonstrate avoidance responses.

1533. Furthermore, it should be noted that the eastern extent of the seaward expansion of The Murrough SPA and the OECC where it overlaps The Murrough SPA and parts of the OECC within 2 km of The Murrough SPA (i.e. within a distance at which red-throated divers within The Murrough SPA may theoretically undertake avoidance responses), all lie within an existing, busy shipping corridor, on the southern approach to Dublin Port (**Chapter 16 Shipping and Navigation**). This shipping corridor is used by very large cargo vessels travelling between Dublin and a number of other ports (most notably Rotterdam), with average daily passage rates of approximately nine – 12 cargo vessels, in addition to additional fishing and recreational vessel traffic.

1534. I-WeBS coverage of the North Wicklow Coastal Marshes, corresponding with the area of The Murrough SPA and available at Site Summary Tables S27 (caspio.com)) provides a 10-year mean peak wintering count of red-throated diver of 74 individuals for the period 2011 / 12 to 2020 / 21, with peak counts occurring during December (which corresponds with the migration-free non-breeding period of red-throated diver). If red-throated diver are assumed to be evenly distributed throughout the SPA, this equates to up to 4.95, 2.50 and 0.13 individuals occurring within areas of the SPA within maximum, mean and minimum vessel avoidance response ranges of any operation and maintenance phase activity works within the OECC in the vicinity of The Murrough SPA.

1535. Given the limited duration of potential disturbance impacts associated with potential maintenance activities within the OECC during the operational phase of the project, the small potential number (at most) of individuals within a small part of the SPA, where baseline levels of vessel disturbance are already high, the potential for operation and maintenance phase activity within the OECC to cause meaningful additional displacement effects to the red-throated diver SCI of The Murrough SPA is assed to be negligible. Therefore, there is no potential for such activities to result in AESI in relation to the Conservation Objectives and attributes and targets for these SCIs as stated in **Table 2-22**.

Proposed mitigation

1536. Despite disturbance and displacement impacts associated with operation and maintenance phase activities within the OECC not resulting in AESI to the red-throated diver SCI of The Murrough SPA, due to the proximity of the array site and OECC to the SPA (the latter overlapping a small area of the SPA over an area of 0.014km^2), additional mitigation in the form protocols within an operation and maintenance phase vessel management plan will be implemented to minimise potential vessel related disturbance to red-throated diver.

1537. These protocols shall include avoiding any non-essential vessel transits through The Murrough SPA where practicable and routing maintenance vessel movements to make preferential use of existing shipping lanes in order to minimise vessel activities outside of areas in which baseline levels of vessel transit are high.

Residual impacts

1538. As per project-only assessment, above.

1539. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-22**. With regards to disturbance and displacement during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance phase impact 3 – Changes in prey availability

Array site

Project-only assessment

1540. Changes in prey availability have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1541. Although red-throated diver is a relatively generalist piscivorous forager, some fish species upon which this SCI predates, may experience the loss of up 0.49 km^2 of previously available benthic habitat within the array site as a result of alteration of the seabed during the operation and maintenance phase of the Project. The areas which may experience long-term alteration of any benthic habitats which have the potential to support populations of key prey species constitute only a very small proportion of the extent of red-throated diver foraging areas.

1542. Similarly, as operational phase activities do not include piling works or any other very high energy underwater noise inducing activities, and operational noise impact magnitudes to all potential prey species are assessed to be very low, there is not considered to be a pathway for operation and maintenance phase underwater noise impacts to have the potential to cause changes to prey availability in such a way that could impact this SCI.

1543. During the operation and maintenance phase, one additional potential impact to seabird receptor prey species which does not occur during the construction phase is considered to be the presence of electromagnetic field (EMF) effects, associated with electricity passing along infrastructure cables. Any effects on fish are anticipated to occur within the immediate vicinity of the cable and effect levels are likely to be low in relation to background levels associated with the Earth's magnetic field. The magnitude of such impacts to potentially sensitive fish species are assessed as being very low. Consequently, there is not considered to be a pathway for operation and maintenance phase EMF impacts to have the potential to cause impacts to prey availability in such a way that could impact this SCI.

1544. On this basis, there is assessed to be no potential for AESI arising from long-term alteration of areas of key prey species' benthic habitat during the operational phase, such that the Conservation Objectives and attributes and targets for this SCI, as stated in **Table 2-22**, will not be affected.

Proposed mitigation

1545. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1546. As per project-only assessment, above.

OECC (including intertidal landfall area)

Project-only assessment

1547. Changes in prey availability have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1548. Up to 0.11 km^2 of benthic habitat that would have been previously available to support the prey species of red-throated diver will be lost within the OECC as a result of alteration of the seabed during the operation and maintenance phase of the Project. These areas of previously available prey species habitat would occur on an ex situ basis in relation to the red-throated diver SCI (i.e., in regions beyond this species' foraging range within The Murrough SPA). The areas which may experience long-term alteration of any benthic habitats which have the potential to support populations of key prey species constitute only a very small proportion of the extent of red-throated diver foraging areas.

1549. Similarly, as operational phase activities do not include piling works or any other very high energy underwater noise inducing activities, and operational noise impact magnitudes to all potential prey species are assessed to be very low, there is not considered to be a pathway for operation and

maintenance phase underwater noise impacts to have the potential to cause changes to prey availability in such a way that could impact this SCI.

1550. During the operation and maintenance phase, one additional potential impact to seabird receptor prey species which does not occur during the construction phase is considered to be the presence of electromagnetic field (EMF) effects, associated with electricity passing along infrastructure cables. Any effects on fish are anticipated to occur within the immediate vicinity of the cable and effect levels are likely to be low in relation to background levels associated with the Earth's magnetic field. The magnitude of such impacts to potentially sensitive fish species are assessed as being very low. Consequently, there is not considered to be a pathway for operation and maintenance phase EMF impacts to have the potential to cause impacts to prey availability in such a way that could impact this SCI.

1551. On this basis, there is assessed to be no potential for AESI arising from long-term alteration of areas of key prey species' benthic habitat during the operational phase, such that the Conservation Objectives and attributes and targets for this SCI, as stated in **Table 2-22**, will not be affected.

Proposed mitigation

1552. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1553. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1554. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-22**. With regards to changes in prey availability during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance impact 4 – Collision

Array site

Project-only assessment

1555. During the operation and maintenance phase of the CWP Project the presence of operational WTGs within the array site may result in the mortality of this SPA SCI through the collision of individuals with turbine blades. Collision mortality has the potential to impact on the following Conservation Objective attribute and target for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats.

1556. In relation to this Conservation Objective attribute, mortality resultant from collision with operational WTGs within the array site may directly affect the overall survival rate of this SPA SCI. This potential consequence may compromise the ability of the SCI to maintain its population on a long-term basis.

1557. No flight activity of red-throated diver recorded within the array site during baseline surveys (see **Technical Appendix 10.5: Baseline Characterisation Report** of the EIAR). Consequently, CRM has not been undertaken for this species on the basis that any collision mortality rates will be extremely low and the resultant mortality rates to this SCI would be negligible.

1558. Although individuals associated with the non-breeding red-throated diver SCI of The Murrough SPA may pass through the array site during post-breeding migration, migration-free non breeding and return migration periods, any collision mortality to this SCI would be negligible and this impact will not result in an AESI in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-22**.

1559. As additional mortality to this SPA SCI resulting from collision with operational WTGs is estimated to represent only a negligible potential increase to SPA baseline mortality rates, this impact is considered not to impede the overall objective of maintaining / restoring the favourable conservation condition of the SPA SCI. Specifically, collision mortality will not affect the population dynamics of the SCI in such a way as to compromise its ability to maintain itself on a long-term basis as a viable component of its natural habitats. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

1560. No specific mitigation is proposed, or required, in respect of collision during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1561. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1562. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-22**. With regards to collision impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

2.5.4 Receptor 4: Little tern

Construction Phase Impacts

Construction phase impact 1 – Direct effects on habitat

Array site

Project-only assessment

1563. Although the distance between the little tern breeding colony within the Murrough SPA at Kilcoole and the array site is considerably greater than the maximum recorded foraging range of this species (13.1 km compared to a maximum foraging range of 5 km – Woodward et al., 2019), little tern were reported

foraging in offshore areas within the vicinity of the array site during the visual aerial ObSERVE surveys during the summer and autumn periods of 2016 – Jessopp et al., 2018). As such, there is considered to be the potential that little tern breeding within The Murrough SPA may experience direct effects on habitat impacts as a consequence of construction phase activities within the array site.

1564. With regards to the array site, relevant construction phase direct effects on habitat relate to the alteration of sea surface areas as they become occupied by the footprint of installed infrastructure and, therefore, unavailable for use by seabird SCIs to undertake non-foraging behaviours.

1565. As construction of the array site progresses through its planned duration of approximately 2.5 years, the above sea level spatial extent of infrastructure will increase to a maximum of less than 0.005 km^2 within the array site (i.e., combined sea level area of all WTGs and OSSs). This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1566. In relation to these Conservation Objective attributes, construction within the array site may reduce the marine areas in which individuals can undertake foraging behaviours. These potential consequences of construction phase activities within the array site may affect the energetic costs of foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

1567. Although the distance between the little tern breeding colony within the Murrough SPA at Kilcoole and the array site is considerably greater than the maximum recorded foraging range of this species (13.1 km compared to a maximum foraging range of 5 km – Woodward et al., 2019), little tern were reported foraging in offshore areas within the vicinity of the array site during the visual aerial ObSERVE surveys during the summer and autumn periods of 2016 – Jessopp et al., 2018). As such, there is considered to be the potential that little tern breeding within The Murrough SPA may experience direct effects on habitat impacts as a consequence of construction phase activities within the array site.

1568. Despite the above potential pathways to impact, these direct effects on habitat do not affect any area of the SPA (and hence do not affect the distribution of foraging, roosting or breeding habitat of this SCI within the SPA). Further, the area of habitat loss represents a negligible proportion of sea area within the foraging range of little tern breeding within this SPA and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

1569. In the context of the area of available habitat within foraging range of the SPA, and the negligible proportion that will be lost within the array site during construction, the scale of direct effects on habitat within the array site is considered to be negligible. In particular, the reduction in marine areas in which to undertake non-foraging behaviours, or requirement to use alternative areas for non-foraging behaviours, is not expected to give rise to energetic costs of non-foraging behaviours in such a way as to affect the condition of individuals and consequent survival rates. Accordingly, the level of impact is not considered capable of resulting in a significant decline in the breeding population abundance or passage population of the little tern SCI.

1570. Given the relatively large separation distance between the array site and the little tern breeding colony within The Murrough SPA and that little tern typically forage within shallow coastal waters within 1 km of the coast (Natural England, 2012), it is reasoned that, should individuals from the SPA breeding colony utilise habitats within or close to the array site, they would be likely to do so infrequently and areas within and around the array site would not constitute key habitat use locations for the little tern SCI of The Murrough SPA.

1571. Should individuals from The Murrough SPA little tern breeding colony utilise areas within the array site, the areas occupied by infrastructure and works by construction phase vessel represents only a negligible proportion of sea area within their foraging range and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

1572. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of little tern in the SPA. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on this SPA.

1573. Consequently, there is assessed to be no potential for AESI to result from direct effects on habitat during construction phase activities within the array site in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-22**.

Proposed mitigation

1574. No specific mitigation is proposed, or required, in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1575. As per project only assessment, above.

Project-only effect on site integrity conclusion for impact

1576. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-22**. With regards to direct effects on habitat impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Construction phase impact 2 – Changes in prey availability

Array site

Project-only assessment

1577. As the array site does not overlap this SPA and the SPA is beyond the range in which prey species may experience potential impacts from construction phase works, potential changes in prey availability impacts will occur entirely outside of the SPA, i.e., all impacts assessed here relate to prey species within ex situ habitats which may support this SPA SCI.

1578. Little tern depredates a range of fish species, particularly clupeids and sandeels; of these, clupeids are anticipated to be most impacted by underwater noise during the construction phase. Construction phase activities within the array site which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1579. These Conservation Objective attributes have the potential to be impacted through injury, mortality or TTS impacts on prey species, primarily during piling operations, they may also be impacted by Increased suspended sediment impacts to seabird prey species, primarily from dredging and trenching.

1580. Injury or mortality for prey species may occur for individuals occurring very close to high noise level construction activities (primarily piling operations); however, such effects will be localised and will be minimised by 'soft start' procedures allowing mobile prey individuals to vacate very high noise level areas, prior to noise levels resulting in injury or mortality being reached. TTS impacts may result from exposure of prey species to lower underwater noise levels and consequently are experienced over a larger area than direct injury/mortality impacts.

1581. Although the distance between the little tern breeding colony within the Murrough SPA at Kilcoole and the array site is considerably greater than the maximum recorded foraging range of this species (13.1 km compared to a maximum foraging range of 5 km – Woodward et al., 2019), little tern were reported foraging in offshore areas within the vicinity of the array site during the visual aerial ObSERVE surveys during the summer and autumn periods of 2016 – Jessopp et al., 2018). As such, there is considered to be the potential that little tern breeding within The Murrough SPA may experience changes in prey availability impacts as a consequence of construction phase activities within the array site.

1582. Given the relatively large separation distance between the array site and the little tern breeding colony within The Murrough SPA and that little tern typically forage within shallow coastal waters within 1 km of the coast (Natural England, 2012), it is reasoned that, should individuals from the SPA breeding colony forage within or close to the array site, where underwater noise, alterations to benthic habitat and increased SSC levels during construction may affect the distribution of prey fish species, they would be likely to do so infrequently and areas within and around the array site would not constitute key foraging locations for the little tern SCI of The Murrough SPA.

1583. These Conservation Objective attributes have the potential to be impacted through increased suspended sediment impacts to seabird prey species, primarily from dredging and trenching.

1584. Consequently, there is assessed to be no potential for AESI to result from changes in prey availability during construction phase activities within the array site in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-22**.

Proposed mitigation

1585. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1586. As per project-only assessment, above.

OECC

Project-only assessment

1587. Little tern depredates a range of fish species, particularly clupeids and sandeels; of these, clupeids are anticipated to be most impacted by underwater noise during the construction phase. Construction

phase activities within the OECC which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1588. These Conservation Objective attributes have the potential to be impacted through increased suspended sediment impacts to seabird prey species, primarily from dredging and trenching.

1589. Underwater noise impacts to prey species are anticipated to very limited, as no pile driving activities are proposed in relation to the installation of the export cable within OECC, with high energy underwater noise sources limited to the potential treatment of a small number of UXO (fewer than ten).

1590. Although the distance between the little tern breeding colony within the Murrough SPA at Kilcoole and the OECC is greater than the maximum recorded foraging range of this species (6.7 km compared to a maximum foraging range of 5 km – Woodward et al., 2019), little tern were reported foraging in offshore areas within the vicinity of the OECC during visual aerial ObSERVE surveys during the summer and autumn periods of 2016 – Jessopp et al., 2018). As such, there is considered to be the potential that little tern breeding within The Murrough SPA may experience changes in prey availability impacts as a consequence of construction phase activities within the OECC.

1591. Given the relatively large separation distance between the OECC and the little tern breeding colony within The Murrough SPA and that little tern typically forage within shallow coastal waters within 1 km of the coast (Natural England, 2012), it is reasoned that, should individuals from the SPA breeding colony forage within or close to the OECC, where alterations to benthic habitat and increased SSC levels during construction may affect the distribution of prey fish species (note that, as no piling occurs during the construction phase within the OECC, underwater noise impacts to prey species associated with works in this area are negligible), they would be likely to do so infrequently and areas within and around the OECC would not constitute key foraging locations for the little tern SCI of The Murrough SPA.

1592. The spatial extent of temporarily disturbed areas of benthic habitat during construction phase activities within the OECC (up to 5.63 km^2) is also assessed to be of negligible size in relation to this SCI's breeding and non-breeding season range extents. Within these areas, benthic communities are typically resilient to localised habitat disturbance, demonstrating high or very high levels of recoverability (i.e. within weeks or months).

1593. It is expected that prey species likely to occur in the vicinity of construction activities within the OECC will be largely unaffected by resultant low-level temporary increases in suspended sediment concentration, as the concentrations are likely to be within the range of natural variability tolerated by these species and will reduce to background concentrations within a very short period.

1594. Consequently, there is assessed to be no potential for AESI to result from changes in prey availability during construction phase activities within the OECC in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-22**.

Proposed mitigation

1595. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1596. As per project only assessment, above.

Project-only effect on site integrity conclusion for impact

1597. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-22**. With regards to changes to prey availability during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and Maintenance Phase Impacts

Operation and maintenance phase impact 1 – Direct effects on habitat

Array site

Project-only assessment

1598. Although the distance between the little tern breeding colony within the Murrough SPA at Kilcoole and the array site is considerably greater than the maximum recorded foraging range of this species (13.1 km compared to a maximum foraging range of 5 km – Woodward et al., 2019), little tern were reported foraging in offshore areas within the vicinity of the array site during the visual aerial ObSERVE surveys during the summer and autumn periods of 2016 – Jessopp et al., 2018). As such, there is considered to be the potential that little tern breeding within The Murrough SPA may experience direct effects on habitat impacts as a consequence of the presence of operational infrastructure within the array site.

1599.

1600. With regards to the array site, relevant operation and maintenance phase direct effects on habitat relate to the alteration of sea surface areas as they become occupied by the footprint of installed infrastructure and, therefore, unavailable for use by seabird SCIs to undertake non-foraging behaviours.

1601. As operation and maintenance of the array site progresses through its planned duration of approximately 2.5 years, the above sea level spatial extent of infrastructure will increase to a maximum of less than 0.005 km^2 within the array site (i.e. combined sea level area of all WTGs and OSSs). This direct effect on habitat has the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1602. In relation to these Conservation Objective attributes, the presence of built infrastructure following the removal of previously available habitat may reduce the marine areas in which individuals can undertake foraging. These potential consequences of the spatial footprint of operational infrastructure within the array site may affect the energetic costs of foraging behaviours and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

1603. Although the distance between the little tern breeding colony within the Murrough SPA at Kilcoole and the array site is considerably greater than the maximum recorded foraging range of this species (13.1 km compared to a maximum foraging range of 5 km – Woodward et al., 2019), little tern were reported foraging in offshore areas within the vicinity of the array site during the visual aerial ObSERVE surveys during the summer and autumn periods of 2016 – Jessopp et al., 2018). As such, there is considered to be the potential that little tern breeding within The Murrough SPA may experience direct effects on habitat impacts as a consequence of operation and maintenance phase activities within the array site.

1604. As the operation and maintenance phase progresses through its planned duration of 25 years, the above sea level spatial extent of infrastructure will at no point exceed 0.005 km^2 within the array site (i.e., combined sea level area of all turbines and OSSs). In addition to this will be the footprints of a total up to a maximum of 14 vessels within the array site and OECC (up to 1,209 round trips per annum) during the operation and maintenance phase.

1605. Given the relatively large separation distance between the array site and the little tern breeding colony within The Murrough SPA and that little tern typically forage within shallow coastal waters within 1 km of the coast (Natural England, 2012), it is reasoned that, should individuals from the SPA breeding colony utilise habitats within or close to the array site, they would be likely to do so infrequently and areas within and around the array site would not constitute key habitat use locations for the little tern SCI of The Murrough SPA.

1606. Should individuals from The Murrough SPA little tern breeding colony utilise areas within the array site, the areas occupied by infrastructure and works by operation and maintenance phase vessels represents only a negligible proportion of sea area within their foraging range and a smaller still proportion of the wider Irish Sea and Western UK-waters region likely used by the majority of SPA individuals outside of the breeding period.

1607. Consequently, there is assessed to be no potential for AESI to result from direct effects on habitat arising from operation and maintenance phase activities within the array site in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-22**.

Proposed mitigation

1608. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1609. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1610. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-22**. With regards to direct effects on habitat impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance phase impact 2 – Changes in prey availability

Array site

Project-only assessment

1611. As the array site does not overlap this SPA and the SPA is beyond the range in which prey species may experience potential impacts from operation and maintenance phase works, potential changes in prey availability impacts will occur entirely outside of the SPA, i.e., all impacts assessed here relate to prey species within ex situ habitats which may support this SPA SCI.

1612. Little tern depredates a range of fish species, particularly clupeids and sandeels; of these, clupeids are anticipated to be most impacted by underwater noise. Operation and maintenance phase activities within the array site which may affect those prey species have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1613. In relation to these Conservation Objective attributes, maintenance activities during the operational phase of the array site may impact little tern prey species through underwater noise effects, increases to suspended sediment concentrations, removal or alteration of important benthic habitats for those prey species, or electromagnetic field effects affecting prey species distributions around electrical infrastructure. Should these impacts to prey species reduce the availability of those prey species to foraging little terns, this may result in effects to the demographic parameters, and resultant population dynamics, of this SCI through processes such as increased energetic consequences of foraging reducing individual condition and survival or productivity rates, or reduced provisioning rates to offspring reducing productivity rates. These potential consequences may compromise the ability of the SCI to maintain its population, with prey availability changes potentially resulting in there being insufficient habitat to support the SCI's population on a long-term basis.

1614. As operational phase activities within the array site will not include piling works or any other very high energy underwater noise inducing activities, and operational noise impact magnitudes to all potential prey species are assessed to be very low, there is not considered to be a pathway for operation and maintenance phase underwater noise impacts to have the potential to cause perceptible changes to prey availability in such a way that could impact this SCI.

1615. Similarly, as operational phase activities within the array site do not routinely require disturbance of the seabed (in the form of trenching or dredging activities) except within localised areas in which this is necessary to facilitate repairs, increased SSC levels, are considered to occur only potentially infrequently and locally during the operational phase and there is no perceptible pathway for this impact to have the potential to cause changes to prey availability during the operational phase in such a way that could impact this SCI.

1616. Key fish species, upon which little tern predate, may experience the loss of up to 0.49 km^2 of previously available benthic habitat within the array site as a result of occupancy of the seabed by infrastructure during the operation and maintenance phase of the CWP Project. The spatial extent of such prey species habitat loss is, however, considered to be of negligible size in relation to this SCI's breeding and non-breeding season range extents.

1617. Although the distance between the little tern breeding colony within the Murrough SPA at Kilcoole and the array site is considerably greater than the maximum recorded foraging range of this species (13.1

km compared to a maximum foraging range of 5 km – Woodward et al., 2019), little tern were reported foraging in offshore areas within the vicinity of the array site during the visual aerial ObSERVE surveys during the summer and autumn periods of 2016 – Jessopp et al., 2018). As such, there is considered to be the potential that little tern breeding within The Murrough SPA may experience changes in prey availability impacts as a consequence of operation and maintenance phase activities within the array site.

1618. During the operation and maintenance phase, one additional potential impact to seabird receptor prey species which does not occur during the construction phase is considered to be the presence of electromagnetic field (EMF) effects, associated with electricity passing along infrastructure cables. Any effects on fish are anticipated to occur within the immediate vicinity of the cable and effect levels are likely to be low in relation to background levels associated with the Earth's magnetic field. The magnitude of such impacts to potentially sensitive fish species are assessed as being very low. Consequently, there is not considered to be a pathway for operation and maintenance phase EMF impacts to have the potential to cause impacts to prey availability in such a way that could impact this SCI.

1619. In the context of the extent of available habitat within foraging range of the SPA, the negligible proportion of that habitat in which potential impacts to prey species may occur, and that potential impacts to prey species may be of limited (if any) demographic consequence to their seabird predators, the scale of changes in prey availability impacts associated with operation and maintenance phase activities within the array site is considered to be negligible.

1620. In particular, potential changes to prey availability resultant from operation and maintenance phase activities within the array site are not expected to perceptibly increase the energetic costs of foraging or lead to reductions in offspring provisioning rates for the little tern SCI of South Dublin Bay and River Tolka Estuary in such a way as to affect demographic parameters. Accordingly, the level of impact is not considered capable of altering the availability of prey species in such a way as to result in a significant decline in the breeding population abundance of this SPA SCI.

1621. Consequently, there is assessed to be no potential for AESI to result from changes in prey availability during operation and maintenance phase activities within the array site in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-22**.

Proposed mitigation

1622. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1623. As per project-only assessment, above.

OECC

Project-only assessment

1624. Little tern depredates a range of fish species, particularly clupeids and sandeels; of these, clupeids are anticipated to be most impacted by underwater noise during the operation and maintenance phase. Operation and maintenance phase activities within the OECC which may affect those prey species

have the potential to impact on the following Conservation Objective attributes and targets for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1625. In relation to these Conservation Objective attributes, maintenance activities during the operational phase of the OECC may impact little tern prey species through underwater noise effects, increases to suspended sediment concentrations, removal or alteration of important benthic habitats for those prey species, or electromagnetic field effects affecting prey species distributions around electrical infrastructure. Should these impacts to prey species reduce the availability of those prey species to foraging little tern, this may result in effects to the demographic parameters, and resultant population dynamics, of this SCI through processes such as increased energetic consequences of foraging reducing individual condition and survival or productivity rates, or reduced provisioning rates to offspring reducing productivity rates. These potential consequences may compromise the ability of the SCI to maintain its population, with prey availability changes potentially resulting in there being insufficient habitat to support the SCI's population on a long-term basis.

1626. Although the distance between the little tern breeding colony within the Murrough SPA at Kilcoole and the OECC is greater than the maximum recorded foraging range of this species (6.7km compared to a maximum foraging range of 5 km – Woodward et al., 2019), little tern were reported foraging in offshore areas within the vicinity of the OECC during the visual aerial ObSERVE surveys during the summer and autumn periods of 2016 – Jessopp et al., 2018). As such, there is considered to be the potential that little tern breeding within The Murrough SPA may experience changes in prey availability impacts as a consequence of operation and maintenance phase activities within the OECC.

1627. As operational phase activities within the OECC will not include piling works or any other very high energy underwater noise inducing activities, and operational noise impact magnitudes to all potential prey species are assessed to be very low, there is not considered to be a pathway for operation and maintenance phase underwater noise impacts to have the potential to cause perceptible changes to prey availability in such a way that could impact this SCI.

1628. Similarly, as operational phase activities within the OECC do not routinely require disturbance of the seabed (in the form of trenching or dredging activities) except within localised areas in which this is necessary to facilitate repairs, increased SSC levels, are considered to occur only potentially infrequently and locally during the operational phase and there is no perceptible pathway for this impact to have the potential to cause changes to prey availability during the operational phase in such a way that could impact this SCI.

1629. During the operation and maintenance phase, one additional potential impact to seabird receptor prey species which does not occur during the construction phase is considered, namely EMF effects, associated with electricity passing along infrastructure cables. Any effects on fish are anticipated to occur within the immediate vicinity of the cable and effect levels are likely to be low in relation to background levels associated with the Earth's magnetic field. The magnitude of such impacts to potentially sensitive fish species are assessed as being very low. Consequently, there is not considered to be a pathway for operation and maintenance phase EMF impacts to have the potential to cause impacts to prey availability in such a way that could impact this SCI.

1630. Given the relatively large separation distance between the OECC and the little tern breeding colony within The Murrough SPA and that little tern typically forage within shallow coastal waters within 1 km of the coast (Natural England, 2012), it is reasoned that, should individuals from the SPA breeding colony utilise habitats within or close to the OECC, they would be likely to do so infrequently and areas within and around the OECC would not constitute key foraging locations for the little tern SCI of The Murrough SPA.

1631. In the context of the extent of available habitat within foraging range of the SPA, the negligible proportion of that habitat in which potential impacts to prey species may occur, and that potential impacts to prey species may be of limited (if any) demographic consequence to their seabird predators, the scale of changes in prey availability impacts associated with operation and maintenance phase activities within the array site is considered to be negligible.

1632. In particular, potential changes to prey availability resultant from operation and maintenance phase activities within the array site are not expected to perceptibly increase the energetic costs of foraging, or lead to reductions in offspring provisioning rates for this SPA SCI in such a way as to affect demographic parameters. Accordingly, the level of impact is not considered capable of altering the availability of little tern prey species in such a way as to result in a significant decline in the breeding population abundance of this SPA SCI.

1633. Consequently, there is assessed to be no potential for AESI to result from changes in prey availability impacts arising from operation and maintenance phase activities within the OECC in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-22**.

Proposed mitigation

1634. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1635. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1636. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-22**. With regards to changes in prey availability during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

Operation and maintenance impact 4 – Collision

Array site

Project-only assessment

1637. During the operation and maintenance phase of the CWP Project the presence of operational WTGs within the array site may result in the mortality of this SPA SCI through the collision of individuals with turbine blades. Collision mortality has the potential to impact on the following Conservation Objective attribute and target for this SPA SCI:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats.

1638. In relation to this Conservation Objective attribute, mortality resultant from collision with operational WTGs within the array site may directly affect the overall survival rate of this SPA SCI. Furthermore, collision mortality may also adversely affect the overall productivity rate of this SPA SCI through

reductions to offspring provisioning rates and other parental care metrics. These potential consequences may compromise the ability of the SCI to maintain its population on a long-term basis.

1639. Although the distance between the little tern breeding colony within the Murrough SPA at Kilcoole and the array site is considerably greater than the maximum recorded foraging range of this species (13.1 km compared to a maximum foraging range of 5 km – Woodward et al., 2019), little tern were reported foraging in offshore areas within the vicinity of the array site during the visual aerial ObSERVE surveys during the summer and autumn periods of 2016 – Jessopp et al., 2018). As such, there is considered to be the potential that little tern breeding within The Murrough SPA may experience collision impacts during the operation and maintenance phase with WTGs within the array site during the migration-free breeding season.

1640. Little tern from The Murrough SPA may also pass through the array site during the return and post-breeding migration periods and, as such, may collide with operational WTGs.

1641. Flight activity levels of little tern recorded within the array site during baseline surveys were extremely low (with only one record of the SCI during the return migration period, see **Technical Appendix 10.5: Baseline Characterisation Report** of the EIAR). Consequently, CRM has not been undertaken for this species on the basis that any collision mortality rates will be extremely low and the resultant mortality rates to this SCI would be negligible.

1642. Although little tern from The Murrough SPA breeding colony may pass through the array site, any collision mortality to this SCI would be negligible and this impact will not result in an AESI in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-22**.

1643. As additional mortality to this SPA SCI resulting from collision with operational WTGs is estimated to represent only a negligible potential increase to SPA baseline mortality rates, this impact is considered not to impede the overall objective of maintaining / restoring the favourable conservation condition of the SPA SCI. Specifically, collision mortality will not affect the population dynamics of the SCI in such a way as to compromise its ability to maintain itself on a long-term basis as a viable component of its natural habitats. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to this SPA SCI.

Proposed mitigation

1644. No specific mitigation is proposed, or required, in respect of collision during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1645. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1646. The Conservation Objective and its attributes and targets for this SPA SCI are presented in **Table 2-22**. With regards to collision impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for this SPA SCI.**

2.5.5 Receptor 5-10: Whooper swan to Wigeon

1647. Receptors 5–10 (**Table 2-22**) are grouped here as they are all migrant species that utilise the intertidal habitats; they also all have the same Conservation Objectives, attributes and targets.

Construction phase impact 1 – Direct effects on habitat

OECC Intertidal landfall

Project-only assessment

1648. These wildfowl SCIs which utilise habitats within The Murrough SPA may also use intertidal areas within South Dublin Bay during migration periods or between site movements during the non-breeding period. As such, these SCIs may experience direct effects on habitat from construction phase activities within this area. However, South Dublin Bay, where the OECC intertidal landfall will be sited, is located 22.87 km from the Murrough SPA and, therefore, the potential for impacts within this area affecting The Murrough SPA population or range of any wildfowl SCIs is considered to be limited.

1649. Ex situ direct effects on habitat have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1650. Despite the above potential pathways to impact, these ex situ direct effects on habitat do not affect any area within the Murrough SPA (and hence do not affect the distribution of non-foraging habitat of this SCI within the SPA). Furthermore, given the separation distance between this SPA and the OECC intertidal landfall (22.87 km), only a minimal number of individuals connected with the Murrough SPA are likely to be using impacted areas within South Dublin Bay for non-foraging behaviours at any given time. Accordingly, the numbers of such individuals expected to experience direct effect on habitat impacts from construction phase activities at the OECC intertidal landfall is considered negligible. As such, the potential for direct effects on habitat impacts at the OECC intertidal landfall affecting the Murrough SPA wildfowl populations is *de minimis*. Accordingly, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the non-breeding populations abundance of wildfowl at the Murrough SPA.

1651. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of these SPA SCIs. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the Murrough SPA.

1652. In relation to these Conservation Objective attributes for these SCIs (**Table 2-22**), there will be no potential for direct effects during the construction phase to adversely affect the population or distributions of these SPA SCIs in such a way as to result in AESI.

1653. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to these SPA SCIs.

Proposed mitigation

1654. No specific mitigation is proposed, or required, in respect of direct effects on habitat during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1655. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1656. The Conservation Objective and its attributes and targets for these SPA SCIs are presented in **Table 2-22**. With regards to direct effects on habitat impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for these SCIs and, in turn, that there is **no project-only AESI for these SPA SCIs.**

Construction phase impact 2 – Disturbance and displacement

Array site (barrier effects only)

Project-only assessment

1657. Disturbance and displacement have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1658. Disturbance and displacement impacts to these migrant SCIs arising from the array site during construction are limited to barrier effects, i.e., the possibility they need to fly around the turbines during their annual migrations.

1659. For the purpose of this assessment disturbance and displacement impacts through barrier effects to migratory species are conservatively treated as being the same as during the operational phase (albeit spanning a much shorter duration than those during the operational phase; 16 months, from initial turbine erection to operational, compared to a 25-year operational lifespan – **Chapter 4: Project Description**).

1660. For migratory species, one-off energetic costs associated with relatively small deviations (such as travelling around the array site, rather than straight through) during typically large migratory movements are considered to be inconsequential in relation to energy reserves recruited for migration (Masden et al., 2009).

1661. Therefore, the potential magnitude of impact on birds that only migrate through the array site (including waders and estuarine waterbirds) is considered negligible.

1662. Consequently, there is assessed to be no potential for AESI to result from disturbance and displacement in the form of barrier effects during the construction phase at the array site in relation to the Conservation Objectives and attributes and targets for these SCIs as stated in **Table 2-22**.

Proposed mitigation

1663. No specific mitigation is proposed, or required, in respect of disturbance and displacement during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1664. As per project-only assessment, above.

OECC Intertidal landfall

Project-only assessment

1665. These wildfowl SCIs which utilise habitats within The Murrough SPA may also use intertidal areas within South Dublin Bay during migration periods or between site movements during the non-breeding period. As such, these SCIs may experience disturbance and displacement from construction phase activities within this area. However, South Dublin Bay, where the OECC intertidal landfall will be sited, is located 22.87 km from the Murrough SPA and, therefore, the potential for impacts within this area affecting The Murrough SPA population or range of any wildfowl SCIs is considered to be limited.

1666. Disturbance and displacement effects have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1667. Despite the above potential pathways to impact, the disturbance and displacement effects do not affect any area within the Murrough SPA (and hence do not affect the distribution of non-foraging habitat of this SCI within the SPA). Furthermore, given the separation distance between this SPA and the OECC intertidal landfall (22.87 km), only a minimal number of individuals connected with the Murrough SPA are likely to be using impacted areas within South Dublin Bay for non-foraging behaviours at any given time. Accordingly, the numbers of such individuals expected to experience disturbance and displacement impacts from construction phase activities at the OECC intertidal landfall is considered negligible. As such, the potential for disturbance and displacement impacts at the OECC intertidal landfall affecting the Murrough SPA wildfowl populations is *de minimis*. Accordingly, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the non-breeding populations abundance of wildfowl at the Murrough SPA.

1668. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of these SPA SCIs. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the Murrough SPA.

1669. In relation to these Conservation Objective attributes for these SCIs (**Table 2-22**), there will be no potential for direct effects during the construction phase to adversely affect the population or distributions of these SPA SCIs in such a way as to result in AESI.

1670. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to these SPA SCIs.

Proposed mitigation

1671. No specific mitigation is proposed, or required, in respect of disturbance and displacement during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1672. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1673. The Conservation Objective and its attributes and targets for these SPA SCIs are presented in **Table 2-22**. With regards to disturbance and displacement impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for these SCIs and, in turn, that there is **no project-only AESI for these SPA SCIs.**

Construction phase impact 3 – Changes in prey availability

Project-only assessment

1674. These wildfowl SCIs which utilise habitats within The Murrough SPA may also use intertidal areas within South Dublin Bay during migration periods or between site movements during the non-breeding period. As such, these SCIs may experience change in prey availability effects from construction phase activities within this area. However, South Dublin Bay, where the OECC intertidal landfall will be sited, is located 22.87 km from the Murrough SPA and, therefore, the potential for impacts within this area affecting The Murrough SPA population or range of any wildfowl SCIs is considered to be limited.

1675. Changes in prey availability have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1676. Prey species upon which each of these wintering ornithological SCIs rely include invertebrates such as molluscs (including bivalves) and annelids (including polychaetes). The alteration of habitats which support the prey species of intertidal waterbirds (e.g., during preparation of the seabed for trenching and cabling activities, the burial of export cables within the intertidal zone and the presence of infrastructure footprints within the intertidal zone) have the potential to change the distribution, behaviour or accessibility of prey species for intertidal waterbirds through:

a. Increased suspended sediment levels may alter the distribution of fish and mobile invertebrate species should they respond to avoid areas of altered water column condition.

b. Alteration of habitats which support seabird prey species may reduce the capacity of those habitats to hold or produce intertidal waterbird prey species, thereby reducing the abundance of prey available to foraging intertidal waterbirds within and around impacted areas.

1677. Despite the above potential pathways to impact, changes to prey availability do not affect any area within the Murrough SPA (and hence do not affect the distribution of foraging habitat of this SCI within the SPA). Furthermore, given the separation distance between this SPA and the OECC intertidal

landfall (22.87 km), only a minimal number of individuals connected with the Murrough SPA are likely to be using impacted areas within South Dublin Bay for foraging behaviours at any given time. Accordingly, the numbers of such individuals expected to experience disturbance and displacement impacts from construction phase activities at the OECC intertidal landfall is considered negligible. As such, the potential for changes in prey availability at the OECC intertidal landfall affecting the Murrough SPA wildfowl populations is *de minimis*. Accordingly, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the non-breeding populations abundance of wildfowl at the Murrough SPA.

1678. It is therefore considered that there is no potential for AESI to result from changes in prey availability during construction phase activities within the OECC intertidal landfall area in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-22**.

Proposed mitigation

1679. No specific mitigation is proposed, or required, in respect of changes in prey availability during construction, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1680. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1681. The Conservation Objective and its attributes and targets for these SPA SCIs are presented in **Table 2-22**. With regards to changes in prey availability impacts during the construction phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for these SCIs and, in turn, that there is **no project-only AESI for these SPA SCIs.**

Operation and Maintenance Phase Impacts

Operation and maintenance impact 1 – Direct effects on habitat

OECC Intertidal landfall

Project-only assessment

1682. Given the proximity of The Murrough SPA to South Dublin Bay, wader and waterfowl SCIs which utilise habitats within The Murrough SPA may also, over the course of the non-breeding period, use intertidal areas within South Dublin Bay and, as such may experience ex situ direct effects on habitat impacts from operation and maintenance phase activities within this area.

1683. Impacts considered to be direct effects on habitat may arise as a consequence of maintenance activities which temporarily remove or alter areas of intertidal habitat which are utilised by these SCIs in ex situ areas of South Dublin Bay. Cable landfall duct maintenance activities and potential cable repair works during the operation and maintenance phase within South Dublin Bay have the potential to alter areas of intertidal habitat such that they become temporarily unavailable to these SCIs

connected with The Murrough SPA, which may otherwise utilise those areas for ex situ non-foraging behaviours.

1684. Direct effects on habitat have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1685. In relation to these Conservation Objective attributes, operation and maintenance of the CWP Project OECC intertidal landfall may result in temporary reductions in the spatial extent of the ex situ intertidal areas within South Dublin Bay in which individuals from The Murrough SPA can undertake non-foraging behaviours or require individuals to use alternative areas for non-foraging behaviours. These potential consequences of operation and maintenance phase activities within the OECC intertidal landfall may directly affect demographic parameters (for example, use of alternative roosting areas may increase vulnerability to predation and reduce survival rates), or may affect the energetic costs of non-foraging behaviours through increased occupancy of sub-optimal area and in turn the condition of individuals and their consequent survival and / or productivity rates; and thereby compromise the ability of the SCI to maintain its population.

1686. Despite the above potential pathways to impact, these direct effects on habitat do not affect any area within the Murrough SPA (and hence do not affect the distribution of non-foraging habitat of this SCI within the SPA). Furthermore, given the separation distance between this SPA and the OECC intertidal landfall (22.87 km), only a minimal number of individuals connected with the Murrough SPA are likely to be using impacted areas within South Dublin Bay for non-foraging behaviours at any given time. Accordingly, the numbers of such individuals expected to experience direct effect on habitat impacts from operation and maintenance phase activities at the OECC intertidal landfall is considered negligible. As such, the potential for direct effects on habitat impacts at the OECC intertidal landfall affecting the Murrough SPA wildfowl populations is *de minimis*. Accordingly, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the non-breeding populations abundance of wildfowl at the Murrough SPA.

1687. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of these SPA SCIs. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the Murrough SPA.

1688. In relation to these Conservation Objective attributes for these SCIs (**Table 2-22**), there will be no potential for direct effects during the operation and maintenance phase to adversely affect the population or distributions of these SPA SCIs in such a way as to result in AESI.

1689. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to these SPA SCIs.

Proposed mitigation

1690. No specific mitigation is proposed, or required, in respect of direct effects on habitat during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1691. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1692. The Conservation Objective and its attributes and targets for these SPA SCIs are presented in **Table 2-22**. With regards to direct effects on habitat impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for these SCIs and, in turn, that there is **no project-only AESI for these SPA SCIs.**

Operation and maintenance phase impact 2 – Disturbance and displacement

Array site (barrier effects only)

Project-only assessment

1693. Disturbance and displacement have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1694. Disturbance and displacement impacts to these migrant SCIs arising from the array site during operation and maintenance are limited to barrier effects, i.e. the possibility they need to fly around the turbines during their annual migrations.

1695. For migratory species, one-off energetic costs associated with relatively small deviations (such as travelling around the array site, rather than straight through) during typically large migratory movements are considered to be inconsequential in relation to energy reserves recruited for migration (Masden et al., 2009).

1696. Therefore, the potential magnitude of impact on birds that only migrate through the array site (including waders and estuarine waterbirds) is considered negligible.

1697. Consequently, there is assessed to be no potential for AESI to result from disturbance and displacement in the form of barrier effects during the operation and maintenance phase at the array site in relation to the Conservation Objectives and attributes and targets for these SCIs as stated in **Table 2-22**.

Proposed mitigation

1698. No specific mitigation is proposed, or required, in respect of disturbance and displacement during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1699. As per project-only assessment, above.

OECC Intertidal landfall

Project-only assessment

1700. These wildfowl SCIs which utilise habitats within The Murrough SPA may also use intertidal areas within South Dublin Bay during migration periods or between site movements during the non-breeding period. As such, these SCIs may experience disturbance and displacement from operation and maintenance phase activities within this area. However, South Dublin Bay, where the OECC intertidal landfall will be sited, is located 22.87 km from the Murrough SPA and, therefore, the potential for impacts within this area affecting The Murrough SPA population or range of any wildfowl SCIs is considered to be limited.

1701. Disturbance and displacement effects have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1702. Despite the above potential pathways to impact, the disturbance and displacement effects do not affect any area within the Murrough SPA (and hence do not affect the distribution of non-foraging habitat of this SCI within the SPA). Furthermore, given the separation distance between this SPA and the OECC intertidal landfall (22.87 km), only a minimal number of individuals connected with the Murrough SPA are likely to be using impacted areas within South Dublin Bay for non-foraging behaviours at any given time. Accordingly, the numbers of such individuals expected to experience disturbance and displacement impacts from operation and maintenance phase activities at the OECC intertidal landfall is considered negligible. As such, the potential for disturbance and displacement impacts at the OECC intertidal landfall affecting the Murrough SPA wildfowl populations is *de minimis*. Accordingly, the level of impact is not considered capable of altering the extent of available habitat in such a way as to result in a significant decline in the non-breeding populations abundance of wildfowl at the Murrough SPA.

1703. The CWP Project will therefore not impede the overall objective of maintaining the favourable conservation condition of these SPA SCIs. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI on the Murrough SPA.

1704. In relation to these Conservation Objective attributes for these SCIs (**Table 2-22**), there will be no potential for direct effects during the operation and maintenance phase to adversely affect the population or distributions of these SPA SCIs in such a way as to result in AESI.

1705. In light of these factors, it can be concluded beyond reasonable scientific doubt that the CWP Project will not give rise to any AESI to these SPA SCIs.

Proposed mitigation

1706. No specific mitigation is proposed, or required, in respect of disturbance and displacement during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1707. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1708. The Conservation Objective and its attributes and targets for these SPA SCIs are presented in **Table 2-22**. With regards to disturbance and displacement impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for these SCIs and, in turn, that there is no **project-only AESI for these SPA SCIs.**

Operation and maintenance phase impact 3 – Changes in prey availability

OECC Intertidal landfall

Project-only assessment

1709. These wildfowl SCIs which utilise habitats within The Murrough SPA may also use intertidal areas within South Dublin Bay during migration periods or between site movements during the non-breeding period. As such, these SCIs may experience change in prey availability effects from operation and maintenance phase activities within this area. However, South Dublin Bay, where the OECC intertidal landfall will be sited, is located 22.87 km from the Murrough SPA and, therefore, the potential for impacts within this area affecting The Murrough SPA population or range of any wildfowl SCIs is considered to be limited.

1710. Changes in prey availability have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1711. Prey species upon which each of these wintering ornithological SCIs rely include invertebrates such as molluscs (including bivalves) and annelids (including polychaetes). The alteration of habitats which support the prey species of intertidal waterbirds (e.g., during preparation of the seabed for trenching and cabling activities, the burial of export cables within the intertidal zone and the presence of infrastructure footprints within the intertidal zone) have the potential to change the distribution, behaviour or accessibility of prey species for intertidal waterbirds through:

a. Increased suspended sediment levels may alter the distribution of fish and mobile invertebrate species should they respond to avoid areas of altered water column condition.

b. Alteration of habitats which support seabird prey species may reduce the capacity of those habitats to hold or produce intertidal waterbird prey species, thereby reducing the abundance of prey available to foraging intertidal waterbirds within and around impacted areas.

1712. Despite the above potential pathways to impact, changes to prey availability do not affect any area within the Murrough SPA (and hence do not affect the distribution of foraging habitat of this SCI within the SPA). Furthermore, given the separation distance between this SPA and the OECC intertidal landfall (22.87 km), only a minimal number of individuals connected with the Murrough SPA are likely to be using impacted areas within South Dublin Bay for foraging behaviours at any given time. Accordingly, the numbers of such individuals expected to experience disturbance and displacement impacts from operation and maintenance phase activities at the OECC intertidal landfall is considered negligible. As such, the potential for changes in prey availability at the OECC intertidal landfall affecting the Murrough SPA wildfowl populations is *de minimis*. Accordingly, the level of impact is not considered

capable of altering the extent of available habitat in such a way as to result in a significant decline in the non-breeding populations abundance of wildfowl at the Murrough SPA.

1713. It is therefore considered that there is no potential for AESI to result from changes in prey availability during operation and maintenance phase activities within the OECC intertidal landfall area in relation to the Conservation Objective and attributes and targets for this SCI as stated in **Table 2-22**.

Proposed mitigation

1714. No specific mitigation is proposed, or required, in respect of changes in prey availability during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1715. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1716. The Conservation Objective and its attributes and targets for these SPA SCIs are presented in **Table 2-22**. With regards to changes in prey availability impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for these SCIs and, in turn, that there is **no project-only AESI for these SPA SCIs.**

Operation and maintenance impact 4 – Collision

Array site

Project-only assessment

1717. Collision impacts have the potential to impact on the following Conservation Objective attribute and target for these SPA SCIs:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and

1718. Estimated collision mortality for non-breeding waterfowl of The Murrough SPA, which may pass through the array site during migratory movements, are presented in **Table 2-23**. These values are derived from total collision mortality figures for each species (as determined in **Appendix 10.3 Collision Risk Modelling** of the EIAR), apportioned on the basis of the SPA population (a 10-year mean-peak – 2011 / 12–20 / 21 from the I-WeBS Site Summary Table for 0T401 North Wicklow Coastal Marshes (which covers the onshore and coastal part of The Murrough SPA [available at Site Summary Tables_S27 (caspio.com)]) as a proportion of the wider regional flyway population (Burke et al., 2019).

1719. For example, for regional migratory CRM, total collision mortality impacts to teal are estimated as 2.792 per annum. Of this total 0.033 (1.17%) collision mortalities per annum are apportioned to The Murrough SPA teal population as the annual mean-peak population of this SCI in the North Wicklow Coastal Marshes area is 1.17% of the all-Ireland regional population.

1720. Additional mortalities apportioned to The Murrough SPA were then compared to mean-peak populations of each SCI within the North Wicklow Coastal Marshes I-WeBS area to ascertain whether additional mortality may result in AESI.

Table 2-23: Total annual collision mortalities to wildfowl SCIs of The Murrough SPA, mortalities apportioned to SPA for each SCI and apportioned collision mortalities as a proportion of the North Wicklow Coastal Marshes 10-year mean-peak I-WeBS counts for each SCI

SCI	10-year mean-peak 2011/12 –20/21	Regional population (All Ireland)	Proportion of regional population	Total impact		Impact apportioned to SPA		Impact as proportion of SPA mean peak	
				Option A	Option B	Option A	Option B	Option A	Option B
Whooper swan	62	15370	0.40%	0.195	0.155	0.001	0.001	0.001%	0.001%
Light-bellied brent goose	417	35150	1.19%	0.04	0.035	0.000	0.000	0.000%	0.000%
Greenland white-fronted goose	0	9590	0.00%	0.023	0.02	0.000	0.000		
Greylag goose	210	No collision mortality predicted – Populations of this SCI treated as local migrants only by mCRM tool.							
Teal	419	35740	1.17%	2.792	2.446	0.033	0.029	0.008%	0.007%
Wigeon	1058	55730	1.90%	3.344	2.9	0.063	0.055	0.006%	0.005%

1721. Although migratory wildfowl SCIs from The Murrough SPA may pass through the array site, any collision mortality to these SCIs would be negligible (0.008% or less than North Wicklow Coastal Marshes 10 year mean peak counts). Collision impacts will therefore not result in an AESI in relation to the Conservation Objective and attributes and targets for these SCIs as stated in **Table 2-22**. Specifically, any such negligible increase to baseline mortality is considered not to affect the long-term population trend of these SCIs in such a way as to result in its decline. Thereby, collision impacts to these SCIs of The Murrough SPA will not adversely affect the Conservation Objectives of the SPA to maintain the favourable conservation condition of the SCIs.

Proposed mitigation

1722. No specific mitigation is proposed, or required, in respect of collision during operation and maintenance, as this impact will not give rise to any AESI in relation to this SPA SCI.

Residual impacts

1723. As per project-only assessment, above.

Project-only effect on site integrity conclusion for impact

1724. The Conservation Objective and its attributes and targets for these SPA SCIs are presented in **Table 2-22**. With regards to collision impacts during the operation and maintenance phase of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for these SCIs and, in turn, that there is **no project-only AESI for these SPA SCIs.**

2.5.6 SPA-specific Assessment of Invasive Non-Native Species

Project-only assessment

1725. Given the minimal overlap between The Murrough SPA and areas in which works will be undertaken during both the CWP Project construction and operation and maintenance phases, activities within the OECC have the potential to result in the introduction or spread of INNS which may result in a reduction in the quality of in situ habitats used by the SCIs of The Murrough SPA.

1726. Consideration of the potential impacts to ornithology resulting from the introduction and spread of INNS are herein assessed for all SCIs of The Murrough SPA collectively, as it is considered that potential AESI arising from this impact would manifest similarly regardless of the SCIs affected.

1727. Effects arising from the introduction or spread of INNS within The Murrough have the potential to impact on the following Conservation Objective attributes and targets:

- Population dynamics data on the SCI indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain the SCI's populations on a long-term basis.

1728. In relation to these Conservation Objective attributes, introduction or spread of INNS due to both construction and operation and maintenance phase activities associated with the CWP Project may impede the achievement of SCI Conservation Objective attribute targets broadly through INNS altering the utility of receiving habitats and ecosystems for SCIs.

1729. INNS effects which alter the ecosystems and habitats within the SPA may affect the abundance or distribution of prey species within the SPA and/or the distribution of habitats in which SCIs can undertake key foraging and/or non-foraging behaviours (such as roosting, loafing and maintenance). These impacts, in turn, may adversely affect the populations of SCIs which utilise the SPA, and thereby impede Conservation Objective attribute targets relating to no significant declines in populations of SCIs within the SPA.

1730. In the context of the extent of habitat within the SPA, and the proportion of areas which may experience reduced utility to the SCIs of The Murrough SPA, should invasive non-native species be introduced in relation to construction and/or operation and maintenance phase activities associated with the CWP Project, the scale of potential impacts from the introduction or spread of INNS is likely to be minimal, given the small area of overlap (0.014 km^2). Nevertheless, given the unknown capacity in which any introduced INNS may have the potential to spread within the SPA, AESI cannot be ruled out.

1731. Such impacts are considered potentially capable of altering the population dynamics, or extents of available habitats in such a way as to result in a significant decline in the population abundance, productivity, passage populations and distributions of, and prey biomass available to, the SCIs of The Murrough SPA. Impacts arising from the CWP Project may therefore have the potential impede the overall objective of maintaining / restoring the favourable conservation condition of the SCIs of The Murrough SPA. In light of these factors, AESI to The Murrough SPA cannot be ruled out as a result of construction and/or operation and maintenance phase activities within the OECC intertidal landfall area of the CWP Project.

Proposed mitigation

1732. The implementation of mitigation measures to align with EU policy (specifically EU Regulation 1143 [regarding the prevention and management of the introduction and spread of invasive alien species]; and The EU Biodiversity Strategy for 2030 [which contains a commitment to manage established invasive alien species and decrease the number of Red List species they threaten by 50% by 2030]) in the form of biosecurity protocols outlined within the CEMP, shall eliminate or reduce INNS introduction risks within areas in which construction and/or operation and maintenance activities are undertaken. This will have the effect of eliminating or reducing potential introduction or spread of INNS impacts within supporting habitats of the SCIs of The Murrough SPA.

Residual effect

1733. With the implementation of mitigation as outlined above, given the reduced or eliminated risk of introduction and spread of INNS during construction and/or operation and maintenance phase activities within The Murrough SPA, there is no potential for AESI to result from this impact to the listed SCIs of the SPA when considering the Conservation Objectives, attributes and targets outlined in **Table 2-22**.

Project-only effect on site integrity conclusion for impact

1734. The Conservation Objective and its attributes and targets for the SCI of The Murrough SPA are presented in **Table 2-22**. With regard to introduction or spread of INNS impacts during the construction and/or operation and maintenance phase(s) of the CWP Project, it can be concluded that there is no impediment to the Conservation Objective being met for this SCI and, in turn, that there is **no project-only AESI for SCIs of The Murrough SPA.**