Cambois Connection – Marine Scheme

Part 2 Habitats Regulations Assessment/Appraisal: Report to Inform Appropriate Assessment

sse Renewables

Revision Information

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Glossary

Term	Description
Appropriate Assessment	An assessment to determine the implications of a plan or project on a European site in view of that site's conservation objectives. An Appropriate Assessment forms part of the Habitats Regulations Appraisal/Assessment (HRA) and is required when a project or plan (either alone or in-combination with other plans or projects) is likely to have a significant effect on a European Site.
Annex I Habitat	A natural habitat type of community interest, defined in Annex I of the Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (Habitats Directive). The designation of Special Areas of Conservation (SAC) is required in the UK to ensure the conservation of these habitats. The protection afforded to sites designated prior to EU Exit persists in UK law.
Annex II Species	Animal or plant species of community interest, defined in Annex II of the Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (Habitats Directive). The designation of Special Areas of Conservation (SAC) is required in the UK to ensure the conservation of these species. The protection afforded to sites designated prior to EU Exit persists in UK law.
Baseline	The existing conditions as represented by the latest available survey and other data which is used as a benchmark for making comparisons to assess the impact of the Marine Scheme.
Berwick Bank Wind Farm	Refers to the offshore wind farm from which the Cambois Connection (the Project) will export part of the produced electricity. The array area boundary for BBWF is shown in ES, Volume 4, Figure 5.1. The consent applications for BBWF are currently being determined.
Cambois Connection	Offshore export cables, onshore export cables, an onshore converter station and associated onshore grid connection at the existing Blyth substation near Cambois in Northumberland. The purpose of this infrastructure is to facilitate the export of a portion of the green electricity from the BBWF, allowing the BBWF to reach its full generation capacity before 2030.
Competent Authority	The term derives from the Habitats Regulations and relates to the exercise of the functions and duties under those Regulations. Competent Authorities are defined in the Habitat Regulations as including "any Minister, government department, public or statutory undertaker, public body of any description or person holding a public office". In the context of a plan or project, the Competent Authority is the authority with the power or duty to determine whether or not the proposal can proceed (SNH, 2014).
EU Exit	The withdrawal of the United Kingdom from the European Union.

Term	Description
European Site	A Special Area of Conservation (SAC), or candidate SAC (cSAC); a Special Protection Area (SPA); a site listed as a site of community importance (SCI) as per Scottish Planning Policy (SPP); a possible SAC (pSAC) or potential SPA (pSPA). All Ramsar sites are also protected in the same manner as European sites and included under the HRA process as a result of guidance in the National Planning Policy Framework (NPPF) and National Planning Framework 4 (NPF4).
Habitats Regulations	A term that refers to the collective of legislation (two sets of HRA Regulations) that translate the Habitats Directive into specific legal obligations - The Conservation of Habitats and Species Regulations 2017 - The Conservation of Offshore Marine Habitats and Species Regulations 2017
Habitat Regulations Appraisal / Assessment	A process required by the Habitats Regulations of identifying likely significant effects of a plan or project on a European Site and (where Likely Significant Effects (LSE) are predicted or cannot be discounted) carrying out an appropriate assessment to ascertain whether the plan or project will adversely affect the integrity of the European Site. If adverse effects on integrity cannot be ruled out, the latter stages of the process require consideration of the derogation provisions in the Habitats Regulations.
In-combination Effect	The combined effect of the Marine Scheme in-combination with the effects from a number of different projects on the same feature/receptor.
Landfall	Area and activities associated with the Offshore Export Cables carrying power from BBWF to the shore and which connect the offshore and onshore infrastructure. The Landfall includes areas and activities that extend beyond both MLWS and MHWS.
Likely Significant Effect	Any effect that may reasonably be predicted as a consequence of a plan or project that may affect the conservation objectives of the features for which the European Site was designated but excluding trivial or inconsequential effects. A likely effect is one that cannot be ruled out on the basis of objective information. A 'significant' effect is a test of whether a plan or project could undermine the site's conservation objectives (SNH, 2014).
Marine Scheme	Proposed infrastructure and activities required as part of the Cambois Connection seaward of the Mean High Water Springs (MHWS).
Migratory Waterbirds	Species of waders and waterfowl that are ecologically dependant on wetlands and which make regular migrations along the coast of the UK and/or non-breeding individuals that overwinter in the UK.
National Site Network	The National Site Network comprises SPAs and SACs designated (or proposed) on EU Exit day and which formerly formed part of the Natura 2000 network. The term 'National Site Network' is used in each of the Habitats Regulations and the

Term	Description
	terms refers to the same network of sites defined under the Habitats Regulations.
Natura 2000 Network	A coherent European ecological network of SACs and SPAs comprising sites located within European Union Member States.
NatureScot	Scotland's Nature Agency
Onshore Scheme	Proposed infrastructure and activities required as part of the Cambois Connection landward of the Mean Low Water Springs (MLWS).
Ramsar Site	Wetlands of international importance designated under the Ramsar Convention.
Seabirds	Birds that spend most of their lives feeding and living on the open ocean, coming ashore only for breeding.
Special Area of Conservation (SAC)	Special Areas of Conservation (SACs) are designated for the conservation of certain plant and animal species listed in the Habitats Directive.
Site of Community Importance (SCI)	Defined in the Habitats Directive as a site which, in the biogeographical region or regions to which it belongs, contributes significantly to the maintenance or restoration at a favourable conservation status of a natural habitat type in Annex I, or of a species in Annex II and may also contribute significantly to the coherence of the Natura 2000 network (or National Site Network). The site may also contribute significantly to the maintenance of biological diversity within the biogeographic region or regions concerned. For animal species ranging over wide areas, SCIs shall correspond to the places within the natural range of such species which represent the physical or biological factors essential to their life and reproduction.
Special Protection Area (SPA)	Special Protection Areas (SPAs) are sites that are designated to protect rare or vulnerable birds (as listed on Annex I of the Directive 2009/147/EC on the conservation of wild birds), as well as regularly occurring migratory species.
Statutory Nature Conservation Bodies' (SNCBs)	The UK Statutory Nature Conservation Bodies (SNCBs) considered to be relevant to the Project are Natural England, NatureScot and the Joint Nature Conservation Committee (JNCC).

Acronyms

Acronym	Description
AEOSI	Adverse Effects on Site Integrity
AON	Apparently Occupied Nests
BBWF	Berwick Bank Wind Farm
BBWFL	Berwick Bank Wind Farm Limited
BOWL	Beatrice Offshore Wind Limited
BTO	British Trust for Ornithology
CEA	Cumulative Effect Assessment
CI	Confidence Intervals
CTVs	Crew Transport Vessels
EC	European Commission
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EMP	Environmental Management Plan
EU	European Union
GB	General Bird
HDD	Horizontal Directional Drilling
HRA	Habitats Regulations Appraisal/Assessment
INNSMP	Invasive and Non-Native Species Management Plan
JNCC	Joint Nature Conservation Committee
LAT	Latitude
LSE	Likely Significant Effects
MARPOL	International Convention for the Prevention of Pollution from Ships
MDS	Maximum Design Scenario
MD-LOT	Marine Directorate – Licencing Operations Team
MFE	Mass-Flow Excavator

Acronym	Description
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
MPCCP	Marine Pollution Contingency and Control Plan
NCC	Northumberland County Council
OCV	Offshore Construction Vessels
OFTO	Offshore Transmission Operator
PLONOR	Pose Little or No Risk
PSA	Particle Size Analysis
pSPA	Potential Special Protection Area
pSAC	Possible Special Area of Conservation
RIAA	Report to inform Appropriate Assessment
SAC	Special Area of Conservation
SBP	Sub-Bottom Profiling
SCI	Site of Community Importance
SD	Standard Deviation
SEGL	Scotland to England Green Link
SMP	Seabird Monitoring Process
SNCBs	Statutory Nature Conservation Bodies'
SNH	Scottish Natural Heritage (now called NatureScot)
SOPEP	Shipboard Oil Pollution Emergency Plan
SPA	Special Protection Area
SSER	SSE Renewable Developments (UK) Limited
UK	United Kingdom
WeBS	Wetland Bird Survey

Units

Unit	Description
km	Kilometre (distance)
km^2	Kilometre squared
m	Metres
m^2	Metre squared
mg/l	Milligrams per litre

1. Introduction

1.1. Overview

4. The RIAA has been prepared by Xodus Group Ltd (Xodus) and the Applicant to support the Habitats Regulations Appraisal/Assessment (HRA[1]) of the Marine Scheme in the determination of the implications for European Sites.

5. The RIAA builds upon the HRA Stage One Screening Report (BBWFL, 2023a included as Appendix 1), which the Applicant submitted to the Competent Authorities (MD-LOT, MMO and Northumberland County Council (NCC) in March 2023)[2]. The report provided supporting information to enable the evaluation of potential pathways for the presence of a Likely Significant Effect (LSE) on the qualifying features and conservation objectives of sites designated as part of the National Site Network (hereafter collectively referred to as 'European Sites') which display potential connectivity with the Marine Scheme.

6. The RIAA considers the likely significant environmental effects of the Marine Scheme as it relates to relevant European site integrity at Stage Two of the HRA process. This report will provide the Competent Authorities with the information required to undertake an HRA Stage Two Appropriate Assessment (see section 3 for more detail on the HRA process).

7. The scope of this document covers all relevant European sites and relevant qualifying interest features where LSEs have been identified due to impacts arising from the Marine Scheme. For the reasons explained, justified, and agreed with stakeholders previously during the Stage One HRA Screening exercise, this is focused on 'offshore' European sites and features (seaward of MHWS).

8. A parallel onshore HRA process has been undertaken for the Onshore Scheme and these onshore elements will be considered (where relevant) here through the in-combination assessment.

1.2. Structure of the RIAA

9. For clarity and ease of navigation, this RIAA is structured and reported in two 'Parts', as follows:

- Part One – Introduction, Background and Consideration of SACs; and
- Part Two (this document) – Consideration of SPAs.

1.3. Structure of this Document

10. This document constitutes Part Two of the RIAA.

11. This RIAA has been prepared to support the HRA of the Marine Scheme in the determination of the implications for European Sites (and specifically, to provide information to the Competent

[1] In Scotland, the term Habitats Regulations Appraisal is used whilst in England, the term Habitats Regulations Assessment is used. Recognising the consistency in process across both jurisdictions, 'HRA' therefore applies to both.

[2] The report, (BBWFL, 2023), provided supporting information to enable the evaluation of potential pathways for the presence of a Likely Significant Effect (LSE) on the qualifying features and conservation objectives of sites designated as part of the National Site Network (hereafter collectively referred to as 'European Sites') which display potential connectivity with the Project.

Authorities to undertake an Appropriate Assessment (see section 3 for more detail on the HRA process).

12. For clarity and ease of navigation, this document is structured and reported under the structure outlined in Table 1.

Table 1 Structure of this document

Section Number	Title
Section 1	Introduction
Section 2	Information to Inform Appropriate Assessment (SPAs)
Section 3	Conclusions of the RIAA (SPAs)
Section 4	References (SPAs)

2. Appraisal of Adverse Effects on Site Integrity – SPAs

2.1. Introduction

13. This section presents information to inform an appropriate assessment of the effects of the Marine Scheme on the integrity of SPAs designated for the conservation of ornithology features. The SPAs included in this assessment are based on conclusions from the HRA Stage One Screening Report (SSER, 2023a) and subsequent screening advice received from NatureScot and Natural England (NatueScot, 2023b; Natural England 2023a) where it was concluded that Likely Significant Effects (LSE) could not be discounted.

14. Table 2-1 presents the SPAs and Ramsar sites with ornithological qualifying features that have been screened into this RIAA.

Table 2-1 European sites designated for ornithological features being considered within the RIAA

SPA (ordered from South (English Waters) to North (Scottish Waters)	Qualifying feature/s (only those features screened into the RIAA are listed)	Distance to Marine Scheme	
		Scottish Marine Scheme	English Marine Scheme
English SPAs			

Teesmouth and Cleveland Coast SPA/Ramsar Site	• Sandwich tern (Non- breeding)
	• Common tern (Breeding)
	• Little tern (Breeding)
	• Knot (*Calidris canutus islandica*) (Non-breeding)
	• Redshank (*Tringa totanus totanus*) (Non-breeding)
	• Ruff (*Calidris pugnax*) (Non-breeding)
	• Avocet (*Recurvirostra avosetta*) (Breeding)
	• Waterbird assemblage (Non-breeding)
	  ○ Shoveler (*Anas clypeata)*
	  ○ Wigeon *(Anas penelope)*
	  ○ Gadwall *(Anas strepera)*
	  ○ Lapwing *(Vanellus vanellus)*
	  ○ Sanderling *(Calidris alba)*
	  ○ Herring gull
	  ○ Black-headed gull
		142 km (S)	45 km (S)

Northumbria Coast SPA/Ramsar Site	• Little tern (Breeding) • Turnstone (*Arenaria interpres*) (Non-breeding) • Purple sandpiper (*Calidris maritima*) (Non-breeding) • Arctic tern (Breeding)	48 km (S)	500m (S)
Northumberland Marine SPA	• Guillemot (*Uria aalge*) (Breeding) • Common tern (*Sterna hirundo*) (Breeding) • Little tern (*Sterna albifrons*) (Breeding) • Sandwich tern (*Sterna sandvicensis*) (Breeding) • Arctic tern (*Sterna paradisaea)* (Breeding) • Puffin (*Fratercula arctica*) (Breeding)	38 km (s)	0 km (direct overlap

SPA (ordered from South (English Waters) to North (Scottish Waters)	Qualifying feature/s (only those features screened into the RIAA are listed)	Distance to Marine Scheme	
		Scottish Marine Scheme	English Marine Scheme

	• Roseate tern (*Sterna dougallii*) (Breeding)
	• Seabird assemblage (breeding) including the components:
	  ○ Cormorant (*Phalacrocorax carbo)*
	  ○ Shag (*Gulosus aristotelis*)
	  ○ Black-headed gull (*Chroicocephalus ridibundus*)
	  ○ Kittiwake (*Rissa tridactyla*)		

Coquet Island SPA	• Common tern (Breeding)
	• Sandwich tern (Breeding)
	• Roseate tern (Breeding)
	• Arctic tern (Breeding)
	• Seabird assemblage (Breeding) including the components:
	  ○ Atlantic puffin
	  ○ Kittiwake
	  ○ Black- headed gull
	  ○ Fulmar (*Fulmarus glacialis*)
	  ○ Herring gull
	  ○ Lesser black-backed gull (*Larus fuscus)*
		79 km (S)	16 km (NW)

Farne Islands SPA	• Guillemot (Breeding)
	• Sandwich tern (Breeding)
	• Roseate tern (Breeding)
	• Common tern (Breeding)
	• Arctic tern (Breeding)
	• Seabird assemblage (Breeding) including the components:
	  ○ Kittiwake
	  ○ Shag
	  ○ Cormorant (*Phalacrocorax carbo*)
	  ○ Puffin
	  ○ Black- headed gull
	  ○ Fulmar
		46 km (S)	35 km (W)

SPA (ordered from South (English Waters) to North (Scottish Waters)	Qualifying feature/s (only those features screened into the RIAA are listed)	Distance to Marine Scheme	
		Scottish Marine Scheme	English Marine Scheme
	○ Great black-backed gull (*Larus marinus)* ○ Lesser black-backed gull ○ Herring gull ○ Razorbill		
Scottish SPAs			
St Abb's Head to Fast Castle SPA	• Seabird assemblage (Breeding) including the components: ○ Razorbill ○ Guillemot ○ Kittiwake ○ Herring gull ○ Shag	37 km (SW)	46 km (W)
Outer Firth of Forth and St Andrews Bay Complex SPA	• Common tern (Breeding) • Arctic tern (Breeding) • Red-throated diver (*Gavia stellata*) (Non-breeding) • Slavonian grebe (*Podiceps auritus*) (Non-breeding) • Eider (*Somateria mollissima*) (Non-breeding) • Gannet (*Morus bassanus*) (Breeding) • Little gull (*Hydrocoloeus minutus*) (Non-breeding) • Shag (*Gulosus aristotelis*) (Breeding and non-breeding) • Waterfowl assemblage (non-breeding) including the components: ○ Long-tailed duck (*Clangula hyemalis*) ○ Common scoter (*Melanitta nigra*) ○ Velvet scoter (*Melanitta fusca*) ○ Common goldeneye (*Bucephala clangula*) ○ Red- breasted merganser (*Mergus serrator*) • Seabird assemblage (breeding) including the components: ○ Puffin ○ Kittiwake ○ Manx shearwater (*Puffinus puffinus*)	2 km (W)	22 km (W)

SPA (ordered from South (English Waters) to North (Scottish Waters)	Qualifying feature/s (only those features screened into the RIAA are listed)	Distance to Marine Scheme	
		Scottish Marine Scheme	English Marine Scheme
	○ Guillemot ○ Herring gull (*Larus argentatus*) • Seabird assemblage (non-breeding) including the components: ○ Black-headed gull (*Chroicocephalus ridibundus*) ○ Common gull (*Larus canus*) ○ Herring gull (*Larus argentatus*) ○ Guillemot ○ Shag ○ Kittiwake ○ Razorbill (*Alca torda*)		
Forth Islands SPA	• Gannet (Breeding) • Puffin (Breeding) • Lesser black-backed gull (Breeding) • Roseate tern (Breeding) • Common tern (Breeding) • Arctic tern (Breeding) • Sandwich tern (Breeding) • Shag (Breeding) • Seabird assemblage (Breeding) including the components: ○ Guillemot ○ Razorbill ○ Kittiwake ○ Herring gull ○ Cormorant	38 km (W)	70 km (W)

2.2. Assessment Information

15. The impact pathways for which potential LSE for ornithological qualifying features could not be ruled out are presented in Table 2-2.

Table 2-2 Impact pathways screened into the RIAA for ornithology

European Site (ordered from South to North)	Qualifying feature/s (only those features screened into the RIAA are listed)	Marine Scheme stage Construction (C) Operation and Maintenance (O&M) Decommissioning (D)	Potential Impact	Relevance to Marine Scheme	
				Scottish Marine Scheme	English Marine Scheme
English SPAs					
Teesmouth and Cleveland Coast SPA/Ramsar Site	• Sandwich tern (Non- breeding) • Common tern (Breeding) • Little tern (Breeding) • Knot (Non-breeding) • Redshank (Non-breeding) • Ruff (Non-breeding) • Avocet (Breeding) • Waterbird assemblage (Non-breeding)	C, O&M, D	Vessel disturbance	✓	✓
		C, D	Nearshore activity (included within assessment of vessel disturbance)	x	✓
		C, O&M, D	Changes in prey availability	✓	✓
Northumbria Coast SPA/Ramsar Site	• Little tern (Breeding) • Turnstone (Non-breeding) • Purple sandpiper (Non-breeding) • Arctic tern (Breeding)	C, O&M, D	Vessel disturbance	✓	✓
		C, D	Nearshore activity (included within assessment of vessel disturbance)	x	✓
		O&M	Long-term habitat loss	✓	✓
		C, O&M, D	Changes in prey availability	✓	✓
Northumberland Marine SPA	• Guillemot (Breeding) • Common tern (Breeding)	C, O&M, D	Vessel disturbance	✓	✓

European Site (ordered from South to North)	Qualifying feature/s (only those features screened into the RIAA are listed)	Marine Scheme stage Construction (C) Operation and Maintenance (O&M) Decommissioning (D)	Potential Impact	Relevance to Marine Scheme	
				Scottish Marine Scheme	English Marine Scheme
	• Little tern (Breeding) • Sandwich tern (Breeding) • Arctic tern (Breeding) • Puffin (Breeding) • Roseate tern (Breeding) • Seabird assemblage (breeding) including cormorant, shag, black-headed gull and kittiwake	C, D	Nearshore activity (included within assessment of vessel disturbance)	x	✓
		O&M	Long-term habitat loss	✓	✓
		C, O&M, D	Changes in prey availability	✓	✓
Coquet Island SPA	• Common tern (Breeding) • Sandwich tern (Breeding) • Roseate tern (Breeding) • Arctic tern (Breeding) • Seabird assemblage (Breeding) including puffin, kittiwake, black- headed gull, fulmar, herring gull, lesser black-backed gull	C, O&M, D	Vessel disturbance	✓	✓
		C, O&M, D	Changes in prey availability	✓	✓
Farne Islands SPA	• Guillemot (Breeding) • Sandwich tern (Breeding) • Roseate tern (Breeding) • Common tern (Breeding) • Arctic tern (Breeding) • Seabird assemblage (Breeding) including kittiwake, shag, cormorant, puffin, black- headed gull, fulmar, great black-backed gull, lesser black-backed gull, herring gull, razorbill.	C, O&M, D	Vessel disturbance	✓	✓
		C, O&M, D	Changes in prey availability	✓	✓
Scottish SPAs					

European Site (ordered from South to North)	Qualifying feature/s (only those features screened into the RIAA are listed)	Marine Scheme stage Construction (C) Operation and Maintenance (O&M) Decommissioning (D)	Potential Impact	Relevance to Marine Scheme	
				Scottish Marine Scheme	English Marine Scheme
St Abb's Head to Fast Castle SPA	• Seabird assemblage (Breeding) including razorbill, guillemot, kittiwake, herring gull, shag	C, O&M, D	Vessel disturbance	✓	✓
		C, O&M, D	Changes in prey availability	✓	✓
Outer Firth of Forth and St Andrews Bay Complex SPA	• Common tern (Breeding) • Arctic tern (Breeding) • Red-throated diver (Non-breeding) • Slavonian grebe (Non-breeding) • Eider (Non-breeding) • Gannet (Breeding) • Little gull (Non-breeding) • Shag (Breeding and non-breeding) • Waterfowl assemblage (non-breeding) including long-tailed duck, common scoter, velvet scoter, common goldeneye, red- breasted merganser • Seabird assemblage (breeding) including puffin, kittiwake, Manx shearwater, guillemot, herring gull. • Seabird assemblage (non-breeding) including black-headed gull, common gull, herring gull, guillemot, shag, kittiwake, razorbill	C, O&M, D	Vessel disturbance	✓	✓
		C, O&M, D	Changes in prey availability	✓	✓
Forth Islands SPA	• Gannet (Breeding) • Puffin (Breeding) • Lesser black-backed gull (Breeding)	C, O&M, D	Vessel disturbance	✓	✓

European Site (ordered from South to North)	Qualifying feature/s (only those features screened into the RIAA are listed)	Marine Scheme stage Construction (C) Operation and Maintenance (O&M) Decommissioning (D)	Potential Impact	Relevance to Marine Scheme	
				Scottish Marine Scheme	English Marine Scheme
	• Roseate tern (Breeding) • Common tern (Breeding) • Arctic tern (Breeding) • Sandwich tern (Breeding) • Shag (Breeding) • Seabird assemblage (Breeding) including guillemot, razorbill, kittiwake, herring gull, cormorant	C, O&M, D	Changes in prey availability	✓	✓

2.2.1. Maximum Design Scenarios

16. The Maximum Design Scenario (MDS) for the assessment of effects on ornithological features is set out in Table 2-3.

Table 2-3 MDS specific to the assessment of effects on ornithological qualifying features

Potential Impact	Maximum Design Scenario	Maximum Design Scenario – Scottish waters and English waters	Justification
Construction and Decommissioning			
Vessel disturbance	Vessel movements based on: • Construction of the Offshore Export Cable Corridor is expected to take up to 18 months with an overall programme of up to 39 months, including site preparation Presence of jack up barge and guard vessel in the nearshore area at Trenchless Technology punch out location for up to 15 months. Construction of the Offshore Export Cable Corridor is expected to take up to 18 months with overall programme of 39 months, including site preparation. **Nearshore:** presence of jack-up barge and guard vessel in the nearshore area at tranchless technology punch out location for up to 15 months. The trenchless technology exit point (punch out location) located seaward of MLWS between 500 m and 2,400 m below MWHS from the trenchless technology entry point. The trenchless technolgy exit pits are expected between the -2.5 m LAT and -10 m LAT. As such, no works are planned to take place in the intertidal zone. Ports used for construction activities within the Marine Scheme are yet to be confirmed, and will be determined as part of competitive tendering processes whilst aiming to maximise UK and Scottish content, It is possible that a number of ports in the region may be utilised during construction.	**In Scottish waters:** • Vessel movements as per the MDS **In English waters:** • Vessel movements as per the MDS **Nearshore:** presence of jack-up barge and guard vessel in the nearshore area at trenchelss letchnology punch out location for up to 15 months. The trenchless technology exit point (punch out location) located seaward of MLWS between 500 m and 2,400 m below MWHS from the trenchless technology Entry point. The trenchelss technology Exit pits are expected between the -2.5 m LAT and -10 m LAT. As such, no works are planned to take place in the intertidal zone.	Maximum number of vessel movements that could foreseeably cause disturbance. Maximum duration of construction activities over which disturbance could occur.

Potential Impact	Maximum Design Scenario	Maximum Design Scenario – Scottish waters and English waters	Justification

Changes in prey availability	• Up to 18 km^2 of temporary habitats loss / disturbance during seabed preparation (e.g. boulder clearance, seabed levelling including sandwave clearance), cable installation and protection.
	• Up to 5,000 m^2 of disturbance from the temporary placement of up to five jack-up vessel deployments in the nearshore area.
	• Up to five exit pits, each 20 x 5 m, for up to four cable ducts (with one spare) due to trenchless cable installation at the Landfall.
	
	Other impacts on fish and shellfish communities include:
	• Increased SSC and associated deposition from construction activities, including:
	  • The mobilisation of sediment from a 3 m deep and 2.5 m wide trench
	  • Installation using any of the following methods: ploughs (displacement and/or non-displacement), jetting machines, mechanical trenchers and MFE. Of these, MFE has been assumed as the worst case with regards to SSC; and
	  • Potential for drilling releases associated with the nearshore trenchelss technology punch-out location.
	• Injury and/or disturbance to fish and shellfish from underwater noise and vibration as a result of construction activities and geophysical surveys (e.g. through the use of sub-bottom profiling (SBP) equipment).
		In Scottish waters:
		• Maximum cable length 160 km;
		• Habitat loss and disturbance: up to 4 km^2 (based on MDS parameters); and
		• Increased SSC: based on MDS parameters.
		
		In English waters:
		• Maximum cable length 560 km;
		• Habitat loss and disturbance: up to 14 km^2 (based on MDS parameters); and
		• Increased SSC: based on MDS parameters including the trenchelss technology punch-out location.
			Maximum parameters for habitat loss/disturbance, increased SSC and underwater noise potentially affecting the availability of prey along the Marine Scheme during seabed preparation work and cable installation.
			
			Further details on maximum volumes of sediment expected to be released during seabed preparation and cable installation and associated dispersion/redeposition rates and distances are provided in Volume 2, Chapter 7: Offshore Physical Environment and Seabed Conditions.

Potential Impact	Maximum Design Scenario	Maximum Design Scenario – Scottish waters and English waters	Justification
	Construction of the Offshore Export Cable Corridor is expected to take up to 18 months with overall programme of 39 months, including site preparation		
Operation and Maintenance			
Vessel disturbance	Vessels used during routine inspections, repairs and replacement and geophysical surveys; maximum vessles on site at any one time including: • Annual routine inspection survey; • Annual geophysical survey(to check the Offshore Export Cables for any evidence of exposure or occurrence of freespans); and • Up to four repair events and four reburial events of up to 1 km each over the 35 year lifetime. Operation and maintenance phase is expected to be up to 35 years. Ports used for maintenance activities within the Marine Scheme are yet to be confirmed, and will be determined as part of competitive tendering processes whilst aiming to maximise UK and Scottish content.	**In Scottish waters:** • Vessel movements as per the MDS **In English waters:** • Vessel movements as per the MDS	Greatest number of activities associated with the Marine Scheme resulting in the maximum number of vessel movements

Potential Impact	Maximum Design Scenario	Maximum Design Scenario – Scottish waters and English waters	Justification
	It is possible that a number of ports in the region may be utilised during operation, although it is likely that only a single port such as that at Blyth would be required.		
Changes in prey availability	Temporary habitat loss/disturbance from up to four repair and reburial events of up to 1 km each over the 35 year lifetime. Increased SSCs and associated sediment deposition from up to four repair and reburial events of up to 1 km each over the 35 year lifetime. Increased noise and vibration from annual geophysical survey and up to four repair and reburial events of up to 1 km each over the 35 year lifetime. Up to 1.46 km^2 of permanent habitat loss due to: • Up to 1.41 km^2 of cable protection associated with up to 37.1 km of per cable (154.8 km in total) at a width of up to 9.5 m; • Up to 0.005 km^2 of cable protection for five cable crossings and up to 200 m of cable requiring protection per crossing at a width of up to 12.5 m; and • Operation and maintenance phase of up 35 years.	**In Scottish waters:** • Maximum cable length 160 km; • Habitat loss and disturbance based on MDS parameters; and • Increased SSC: based on MDS parameters. • Up to 0.23 km^2 of cable protection associated with 6 km per cable (24 km in total). **In English waters:** • Maximum cable length 560 km; • Habitat loss and disturbance based on MDS parameters; and • Increased SSC based on MDS parameters including the trecnhelss technology punch-out location. • Up to 1.18 km^2 of cable protection associated with 31.1 km per cable (124.4 km in total); and	Maximum parameters for habitat loss/disturbance, increased SSC and underwater noise potentially affecting the availability of prey along the Marine Scheme during maintenance activities.

Potential Impact	Maximum Design Scenario	Maximum Design Scenario – Scottish waters and English waters	Justification
		• Up to 0.0105 km^2 of cable protection for five cable crossings.	
Long-term habitat loss	Up to 1.46 km^2 of permanent habitat loss due to: • Up to 1.41 km^2 of cable protection associated with up to 37.1 km of per cable (154.8 km in total) at a width of up to 9.5 m; • Up to 0.005 km^2 of cable protection for four cable crossings and up to 200 m of cable requiring protection per crossing at a width of up to 12.5 m; and • Operation and maintenance phase of up 35 years.	**Scottish waters:** Up to 0.23 km^2 of permanent habitat loss due to: • Up to 0.23 km^2 of cable protection associated with 6 km of per cable (24 km in total) at a width of up to 9.5 m; • Operation and maintenance phase of up 35 years. **English waters**: Up to 1.24 km^2 of permanent habitat loss due to: • Up to 1.18 km^2 of cable protection associated with 31.1 km of per cable (124.4 km in total) at a width of up to 9.5 m; • Up to 0.005 km^2 of cable protection for five cable crossings at a width of up to 12.5 m; and • Operation and maintenance phase of up 35 years.	Maximum seabed footprint which would be affected during the operation and maintenance phase. The total cable protection area and length for the Marine Scheme exceeds the sum of English and Scottish Waters. This is due to the worst-case for the Marine Scheme as a whole being associated with the eastern option for the Marine Scheme Offshore Export Cable Corridor to avoid double counting of both routes for total length.

2.2.2. Measures Adopted as Part of the Marine Scheme

17. Designed in measures relevant to ornithology are set out in Table 2-4.

Table 2-4 Embedded mitigation measures relevant to ornithology

Mitigation Measure	Justification	Applicable Jurisdication
Route Selection and Avoidance.	The Marine Scheme has been specifically refined to avoid interactions with key designations, environmental sensitivities, and notable inshore fishing grounds as far as reasonably practicable. On the approach to the Landfall at Cambois, the route has been selected to minimise the footprint within European Sites. Nearshore routes with greater levels of interactivity with European Sites along the English and Scottish coast have been de-selected. Further detail on this is provided in Volume 2, Chapter 6: Route Appraisal and Consideration of Alternatives	Scottish and English waters
Micro-routeing within the Marine Scheme.	Micro-siting within the Marine Scheme will be carried out to help avoid or minimise interactions with localised engineering and environmental constraints identified during pre-construction surveys.	Scottish and English waters
Landfall construction.	Trenchless techniques, such as Horizontal Directional Drilling (HDD) will be used at the Landfall for the construction of the Marine Scheme. Works associated with Landfall construction activities will avoid any works in the intertidal environment and will reduce the potential for sediment disturbance.	English waters only
Pose Little or No Risk (PLONOR) substances.	During trenchless installation activities at Landfall, there will be an interface between the sea and the drilling fluids used to create the exit pits at the breakouts. Small quantities of drilling fluids may be discharged to the marine environment, however best practice mitigation will be implemented to reduce the amount of drill mud / cuttings released in the event of a release. To limit environmental damage, only biologically inert PLONOR listed drilling fluid will be used.	English waters only
Vessel lighting.	Vessel deck lighting will be directed towards working areas only and kept to the minimum level required to facilitate safe operations. This is to reduce disturbance to seabirds.	Scottish and English waters
Adherence to Scottish Marine Wildlife watching code.	Project vessels (in both Scottish and English waters) will adhere to the protocols supplied in the Scottish Marine Wildlife Watching Code and will protect and reduce the risk of direct interactions and disturbance to marine wildlife, including marine mammals, seabirds and waterfowl.	Scottish and English waters
Shipboard Oil Pollution Emergency Plan (SOPEP).	All vessels to be used as part of any phase of the Project will adopt a waste management plan in line with the requirements set out as part of the International Convention for the Prevention of Pollution from Ships (MARPOL) and the SOPEP.	Scottish and English waters

Mitigation Measure	Justification	Applicable Jurisdication
Vessel best-practice / MARPOL.	Compliance with MARPOL regulations and best-practice protocols to prevent and manage incidents of accidental release of marine contaminants.	Scottish and English waters
Environmental Management Plan (EMP).	An EMP will be developed and employed to ensure potential release for pollutants will be reduced as far as practicable. This will include a Marine Pollution Contingency and Control Plan (MPCCP) and an Invasive and Non-Native Species Management Plan (INNSMP). An outline EMP has been provided as part of this application (Volume 5, Appendix 5.1) and will be updated for submission to MMO and MD-LOT prior to construction.	Scottish and English waters

2.2.3. Baseline Information

18. The Marine Scheme plus a 2 km buffer (Ornithology Study Area used in the Marine Scheme EIA) is considered to be regularly used by at least 35 species of bird, mostly comprising seabirds, seaducks and waders. All these birds are highly mobile species that are part of large to very large receptor populations that range over extensive, and in some cases very extensive, areas of marine and coastal habitat.

19. Baseline information on the European sites identified for further assessment within HRA Stage Two Appropriate Assessment has been collected through a combination of a desktop review of existing studies and datasets, surveys commissioned by the Applicant in support of the separate consent application for BBWF (BBWFL, 2022b) and non-breeding bird surveys undertaken for the Project. Baseline information is presented in detail in Volume 2, Chapter 8 Offshore and Intertidal Ornithology and Volume 3 Appendix 8.2: Intertidal Survey Report

2.2.4. Impacts Requiring Assessment

2.2.5. Construction and Decommissioning

VESSEL DISTURBANCE

20. This effect pathway is relevant to the qualifying features of the SPAs listed in Table 2-2 Impact pathways screened into the RIAA for ornithology.

21. During construction, increased levels of vessel traffic as well as other activities directly associated with the installation of the offshore export cables may cause direct disturbance to marine birds which use the Marine Scheme and surrounding waters for purposes such as foraging and roosting. Similar activities during the decommissioning phase mean that there is also potential for disturbance effects to occur at the decommissioning stage (BBWFL, 2023a).

22. As described in the BBWF RIAA Part 3 SPA Assessment (BBWFL, 2022a.) temporary disturbance may cause changes in behaviour and could potentially lead to a reduction in foraging opportunities or increased energy expenditure, resulting in decreased survival rates or productivity in affected populations.

23. Displacement during the construction and decommissioning phases could arise as a consequence of disturbance, affecting the same range of SPAs. Displacement may cause birds to be excluded from areas of preferred habitat and (where this affects foraging habitat) could potentially lead to a reduction in foraging opportunities, increased competition or increased energy expenditure, resulting in decreased survival rates or productivity in affected populations. As with disturbance, it is assumed that the potential for displacement during decommissioning is similar to that for the construction phase, with the potential for effects expected to extend over a period of similar, or shorter, duration (BBWFL, 2023a).

24. As set out in the MDS (Table 2-3 MDS specific to the assessment) it is expected that the entire Marine Scheme will take up to 39 months to complete, of which installation of the Offshore Export Cables will take 18 months. The maximum number of construction vessels that will be present on site at any one time is 20. This includes two pre-construction vessels required for seabed preparation such as seabed levelling and boulder clearance, two cable installation vessels and two cable protection vessels and a jack-up barge for landfall installation. Whilst the site preparation works will occur for the duration of the construction phase, these will not be continuous. As up to four Offshore Export Cables are to be installed, there are expected to be periods when some site preparation, landfall and cable installation works occur concurrently. A further 10 guard vessels may also be required throughout the construction period. There may also be a requirement for up to two survey/OCV vessels, and two CTVs to be present within the Marine Scheme at any one time. Due to the linear nature of the Marine Scheme, it is expected that the vessels will be moving continuously along the Offshore Export Cable Routes, and therefore will only be present in specific locations for short periods of time (hours to days).

25. Furthermore, construction activities will not occur simultaneously across the entirety of the Marine Scheme. Assuming disturbance occurs at distances of up to 500 m (representative of the potential range of distances needed to protect birds from human disturbance; Goodship and Furness 2022), the area of impact from around a single vessel at any one time would be 0.25 km^2. On this basis a theoretical maximum area of disturbance of up to 5 km^2 could occur across the entire 720 km long Marine Scheme if all 20 vessels were operating simultaneously. However, during construction vessel activity will be clustered around the area of cable laying and therefore the areas of potential disturbance from each vessel will overlap and the overall area of disturbance will be smaller. Thus the total area affected by vessel disturbance over the construction programme will be small relative to the areas used by marine birds throughout the year (e.g. Woodward *et al*., 2019).

26. Birds that are displaced from areas of vessel disturbance will relocate to habitat in the wider vicinity, with studies indicating that numbers present in the area where displacement occurred returning to pre-disturbance levels after a matter of hours (e.g. Schwemmer *et al*. 2011).

27. With regards to the installation of the cables at the Landfall using trenchless technology (such as HDD), there may be a requirement for the presence of a jack-up barge and guard vessel in the nearshore area (at a minimum distance of 250m MLWS) for up to 15 months. However, the jack-up will be static for the majority of the time that it is present in the nearshore area, and any associated CTV movements will be limited in frequency and duration.

28. Routine embedded mitigation measures of standard best practice in relation to navigational protocols and Project Codes of Conduct included as part of the navigational safety and vessel management measures detailed within the Environmental Management Plan (an outline of which accompanies this application in Volume 5) will be issued to all project vessel operators. This would include adherence to the Marine and Coastal Wildlife Code[3] and the Scottish Marine Wildlife Watching Code[4] in order to minimise the potential for any disturbance.

29. The potential for vessel disturbance effects during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

CHANGES TO PREY AVAILABILITY

30. This effect pathway is relevant to the qualifying features of the SPAs listed in Table 2-2 Impact pathways screened into the RIAA for ornithology.

31. As discussed in BBWF RIAA Part 3 SPA Assessment (BBWFL 2022a) indirect effects on marine birds may occur as a result of changes in prey distribution, availability or abundance. Reduction or disruption to prey availability for marine birds may cause displacement from foraging grounds in the area or reduced energy intake, affecting survival rates or productivity in the population in the short-term.

32. Cable installation within the Marine Scheme may lead to temporary subtidal habitat loss/disturbance as a result of a range of activities including seabed preparation, installation of cables and cable protection and the use of jack-up barges at the trenchless technology punch-out location. As outlined in the MDS table, there is potential for up to 18 km^2 of temporary seabed disturbance throughout the Marine Scheme, of which 14 km^2 will be in English Waters and 4 km^2 in Scottish Waters.

33. Construction activities will occur intermittently over a period of up to 39 months. This includes seabed preparation, 15 months for Landfall construction and 18 months for installation of the Offshore Export Cables. Activities from seabed preparation to completion of installation will not all occur at the same time, although some activities may overlap and occur simultaneously for a period of time. Given the intermittent nature of the activities, only a small area of seabed is expected to be disturbed at any one time. Furthermore. recovery of seabed habitats will commence immediately following installation of infrastructure allowing key prey species to repopulate the areas of previous disturbance.

34. Increases in SSC and associated sediment deposition may also reduce the abundance and distribution of prey species. Modelling was undertaken as part of the BBWF EIA to determine the increases in SSC resulting from cable installation associated with the BBWF (BBWFL, 2022b). Average levels of SSC increased to between 50 mg/l and 500 mg/l across the plume extent. These levels dropped to background levels on the slack tide. As peak currents within the BBWF array area are of a similar magnitude to the Marine Scheme, it is likely that any changes in SSC as a result of the BBWF cables

[3] https://www.gov.uk/government/publications/marine-and-coastal-wildlife-code

[4] The Scottish Marine Wildlife Watching Code (nature.scot)

will be of a similar magnitude to the changes in SSC within the Marine Scheme as a result of Offshore Export Cable installation.

35. Respectively the installation of Offshore Export Cables may result in short-term avoidance of affected areas by fish and smothering of sessile organisms such as bivalves. Adult fish have high mobility and may show avoidance behaviour in areas of high sedimentation. However, there may be impacts on the hatching success of fish larvae and consequential effects on the viability of spawning stocks due to limited mobility. As described previously, the PSA results indicate that the seabed along the majority of the Offshore Export Cable corridor is not suitable for spawning, with the exception of some suitable and sub-prime habitat across the Marine Scheme within the BBWF area in Scottish waters. Therefore, the extent to which increased SSC and deposition will affect sandeel is limited. Herring spawning grounds are also found within the Marine Scheme fish and shellfish ecology study area, with their eggs potentially tolerant of very high levels of SSC. Most bivalves are known to be tolerant to sediment deposition due to the nature of re-suspension and deposition within their natural high energy environment, and it is therefore very likely that any effect from increased SSC during construction will be limited (Volume 2, Chapter 9 Fish and Shellfish Ecology) Furthermore, deposited sediments are expected to be removed quickly by the currents resulting in small amount of sediment being deposited. Given the small amount of predicted deposition, local spatial extent and relatively short duration of predicted SSC increases, no effect on survival of these key prey species was predicted by Volume 2, Chapter 9 Fish and Shellfish Ecology.

36. Increases in SSC and associated reductions in water clarity may also affect the ability of foraging marine birds to locate fish at the sea surface and in the water column, reducing the availability of key prey species. However, it is considered that most foraging marine birds will be largely unaffected by the low-level temporary increases in SSC, as the concentrations are likely to be within the range of natural variability (generally <5 mg/l but can increase to over 100 mg/l during storm events/increased wave heights) and will reduce to background concentrations within a very short period (approximately two tidal cycles).

37. There is the potential for underwater noise and vibration during construction to affect the abundance and distribution of prey species. Construction activities will generate a degree of underwater noise (for example from vessel propellers, trenching works (if required) and preconstruction geophysical investigations) but this is not considered to be significant with respect to its intensity and duration. Noise and vibration emitted by construction activities is anticipated to be highly localised, of not more than moderate loudness (e.g., there will be no use of explosives or pile driving) and short-term in nature. The impact of this underwater noise and vibration on fish and shellfish receptors is examined in detail in Volume 2, Chapter 9: Fish and Shellfish Ecology.

38. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. It is currently unclear as to how the presence, and subsequent removal of, subsea structures may affect prey species (Peschko *et al*., 2020; BOWL 2021a, b; Scott, 2022). It is possible that prey abundance could decline from the levels present during the operation and maintenance period. This could occur if cable protection measures lead to an increase in key prey abundance within the Marine Scheme via the provision of artificial reef habitats. However, it is assumed that some cable protection will be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning. Thus, any reduction in prey abundance through removal of subsea structures is likely to be very small relative to the area over which marine birds forage.

2.2.6. Operation and Maintenance

VESSEL DISTURBANCE

39. This effect pathway is relevant to the qualifying features of the SPAs listed in Table 2-2 Impact pathways screened into the RIAA for ornithology

40. As for construction, increased levels of vessel traffic as well as other activities directly associated with the maintenance of the offshore export cables may cause direct disturbance to marine birds which use the Marine Scheme and surrounding waters for purposes such as foraging and roosting. However, during operation and maintenance, levels of vessel traffic associated with the Marine Scheme will be substantially lower than during construction and decommissioning, whilst there will also be an absence of activities analogous to those associated with the installation of infrastructure during construction (Table 2-3 MDS specific to the assessment). The offshore export cables are immobile structures on the seabed with minimal maintenance requirements, so that there will be little associated vessel activity during operation and maintenance (Table 2-3 MDS specific to the assessment). Up to four repair events and four reburial events of up to 1 km each are anticipated under a worst-case basis over the 35 year lifetime. There may also be a requirement for an annual routine inspection and geophysical surveys to check the Offshore Export Cables for any evidence of exposure or occurrence of freespans.

41. As discussed above for construction and decommissioning, the total area affected by vessel disturbance during cable repairs and reburials will be very small (1 km stretches) relative to the areas used by marine birds throughout the year (e.g. Woodward *et al*., 2019). Birds that are displaced from areas of vessel disturbance will relocate to habitat in the wider vicinity, with studies indicating that numbers present in the area where displacement occurred returning to pre-disturbance levels after a matter of hours (e.g. Schwemmer *et al*. 2011).

42. Routine embedded mitigation measures of standard best practice in relation to navigational protocols and Project Codes of Conduct included as part of the EMP (an Outline EMP is included within this application, Volume 5) will be issued to all project vessel operators. This would include adherence to the Marine and Coastal Wildlife Code[5] and the Scottish Marine Wildlife Watching Code[6] in order to minimise the potential for any disturbance.

CHANGES TO PREY AVAILABILITY

43. This effect pathway is relevant to the qualifying features of the SPAs listed in Table 2-2 Impact pathways screened into the RIAA for ornithology.

44. Reduction or disruption to prey availability through temporary and permanent habitat loss due to the presence of cables and associated cable protection, increased SSC and deposition resulting from cable repairs and reburial, electromagnetic fields (EMF) from subsea electrical cabling, and

[5] https://www.gov.uk/government/publications/marine-and-coastal-wildlife-code

[6] The Scottish Marine Wildlife Watching Code (nature.scot)

colonisation of cable protection could affect ornithological features foraging within and in the vicinity of the Marine Scheme.

45. During the operation and maintenance phase, there is potential for temporary habitat loss/disturbance for key prey species. Up to 1.46 km^2 of long-term subtidal habitat loss is also predicted from cable protection measures, with up to 0.23 km^2 of this within Scottish Waters and 1.24 km^2 in English Waters. Many species of fish are reliant upon the presence of suitable subtidal habitat for foraging, spawning and nursing. However, these areas of habitat loss will be discrete, either in the immediate vicinity of cable protection, or relatively small, isolated stretches of cable within large areas of sediment which characterise the baseline environment (i.e. soft sediments), representing a very low proportion of available habitat (0.08% of the fish and shellfish ecology study area). Long-term habitat loss to key prey species during the construction phase was therefore assessed as being of low magnitude in Volume 2, Chapter 9 Fish and Shellfish Ecology.

46. Increased SSC could occur as a result of repair or remedial burial activities during the operation and maintenance phase. The assessment in Volume 2, Chapter 9 Fish and Shellfish Ecology considered that any suspended sediments and associated deposition will be of the same magnitude, or lower as for construction.

47. The presence and operation of Offshore Export Cables will result in emissions of localised EMF, which could potentially affect the sensory mechanisms of some species of fish. However, there is no evidence to suggest that the key prey species are electrosensitive and would respond to electrical and/or magnetic fields.

48. Up to 1.46 km^2 of habitat may be created due to the installation of cable protection measures. Artificial structures introduced to the marine environment provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels. Whilst there is mounting evidence of potential benefits of artificial structures in marine environment (Birchenough and Degrae 2020), the statistical significance of such benefits and details about trophic interactions, particularly in relation to key prey species remain largely unknown (Peschko *et al*., 2020; BOWL 2021a, 2021b; Scott, 2022). Overall, any change in prey abundance and/or distribution through the presence of subsea structures is likely to be very small relative to the area over which breeding and non-breeding SPA seabird species forage.

LONG-TERM HABITAT LOSS

49. This effect pathway is relevant to the qualifying features of the Northumbria Coast SPA and the Northumberland Marine SPA, as listed in Table 2-2 Impact pathways screened into the RIAA for ornithology

50. As outlined for potential impacts from change in prey availability, there is potential for up to 1.46 km^2 of long-term subtidal habitat loss throughout the Marine Scheme through the installation of cable protection measures. Up to 0.23 km^2 of this within Scottish Waters and 1.24 km^2 in English Waters, with approximately 0.4km^2 predicted to occur in the nearshore waters overlapping the Northumberland Marine SPA.

51. However, these areas of habitat loss for key prey species will be discrete, either in the immediate vicinity of cable protection, or relatively small, isolated stretches of cable within large areas of sediment

which characterise the baseline environment (i.e. soft sediments), representing a very low proportion of available foraging habitat for marine birds (0.08% of the fish and shellfish ecology study area). Long-term habitat loss to key prey species during the construction phase was therefore assessed as being of low magnitude in Volume 2, Chapter 9 Fish and Shellfish Ecology.

2.2.7. Additional Information to Inform the Assessments of Effects on Site Integrity

FORAGING RANGES

52. The following breeding season foraging ranges (Woodward *et al.,* 2019) have been used to determine the potential for qualifying features of the SPAs screened into this RIAA.

Table 2-5 Breeding season foraging ranges for relevant SPA qualifying seabird species (Woodward *et al.,* 2019)

Qualifying Feature	Foraging Range (km)		
	Maximum	Mean Max	Mean Max + 1 SD
Eider	22	21.5	21.5
Red-throated diver	9	9	9
Fulmar	2,736	542.3 ± 657.9	1,200.2
Manx shearwater	2,890	1,346.8 ± 1,018.7	2,365.5
Gannet	709	315.2 ± 194.2	509.4
Shag	46	13.2 ± 10.5	23.7
Cormorant	35	25.6 ± 8.3	33.9
Kittwake	770	156.1 ± 144.5	300.6
Black-headed gull	18.5	18.5	18.5
Common gull	50	50	50
Great black-backed gull	73	73	73
Herring gull	92	58.8 ± 26.8	85.6
Lesser black-backed gull	533	127 ± 109	236
Sandwich tern	80	34.3 ± 23.2	57.5
Little tern	5	5	5
Roseate tern	24	12.6 ± 10.6	23.2
Common tern	30	18 ± 8.9	26.9
Arctic tern	46	25.7 ± 14.8	40.5
Guillemot	338	73.2 ± 80.5	153.7

Qualifying Feature	Foraging Range (km)		
	Maximum	Mean Max	Mean Max + 1 SD
Razorbill	313	88.7 ± 75.9	164.6
Puffin	383	137.1 ± 128.3	265.4

SPECIES SENSITIVITY TO VESSEL DISTURBANCE IMPACT

53. Some species are more susceptible to disturbance from vessels than others. For example, there is evidence from studies that demonstrates that species such as divers and scoters may avoid shipping by several kilometres (e.g. Garthe and Hüppop, 2004; Schwemmer *et al*. 2011), while gulls are not considered susceptible to disturbance, as they are often associated with fishing boats (e.g. Camphuysen, 1995; Hüppop and Wurm, 2000).

54. Table 2-6 provides a summary of the rated sensitivity of the key qualifying features of the SPAs included in this RIAA to vessel disturbance. This is based on information from previous sensitivity reviews including:

- Garthe and Hüppop (2004), who developed a scoring system for such disturbance factors, which is used widely in offshore wind farm EIAs;
- Furness and Wade (2012) disturbance ratings for particular species based on Garthe and Hüppop (2004), alongside scores for habitat flexibility and conservation importance in a Scottish context;
- Furness *et al.,* (2012) sensitivity of seabirds to wave and tidal devices;
- Furness *et al*., (2013) sensitivity of seabirds to offshore wind farms; and
- Goodship and Furness (2022) review of disturbance distances for selected bird species.

Table 2-6 Sensitivity of qualifying features of the SPAs included in this RIAA to vessel disturbance.

Qualifying feature	Sensitivity to Distrubance and Displacement	Source
Common eider	High	Furness and Wade (2012) Furness *et al*., (2012)
Red throated diver	Very high	Furness and Wade (2012) Furness *et al*., (2012)
Common scoter	High	Furness and Wade (2012)
Velvet scoter	Medium	Furness and Wade (2012)
Red-breasted merganser	Medium	Furness and Wade (2012)
Goldeneye	High	Furness and Wade (2012)
Long-tailed duck	Low	Furness and Wade (2012)
Slavonian grebe	Medium	Furness and Wade (2012)
Fulmar	Very low	Furness and Wade (2012) Furness *et al*., (2012)
Manx shearwater	Very low	Furness and Wade (2012) Furness *et al*., (2012)
Gannet	Low	Furness and Wade (2012) Furness *et al*., (2012)

Qualifying feature	Sensitivity to Distrubance and Displacement	Source
Shag	Medium	Furness and Wade (2012) Furness *et al*., (2012)
Cormorant	Medium	Furness and Wade (2012) Furness *et al*., (2012)
Kittwake	Low	Furness and Wade (2012) Furness *et al*., (2012)
Black-headed gull	Low	Furness and Wade (2012) Furness *et al*., (2012)
Common gull	Low	Furness and Wade (2012) Furness *et al*., (2012)
Great black-backed gull	Low	Furness and Wade (2012) Furness *et al*., (2012)
Herring gull	Low	Furness and Wade (2012) Furness *et al*., (2012)
Lesser black-backed gull	Low	Furness and Wade (2012) Furness *et al*., (2012)
Sandwich tern	Low	Furness and Wade (2012) Furness *et al*., (2012)
Little tern	Low	Furness and Wade (2012) Furness *et al*., (2012)
Roseate tern	Medium	Furness *et al*., (2012)
Common tern	Low	Furness and Wade (2012) Furness *et al*., (2012)
Arctic tern	Low	Furness and Wade (2012) Furness *et al*., (2012)
Guillemot	Medium	Garthe and Hüppop (2004), Furness and Wade (2012), Furness *et al*. (2013) and Bradbury *et al*. (2014).
Razorbill	Medium	
Puffin	Low	Furness and Wade (2012) Furness *et al*., (2012)
Turnstone	Low	Goodship & Furness (2022)
Purple sandpiper	Low to Medium	Goodship & Furness (2022)
Knot	Medium	Goodship & Furness (2022)
Redshank	Medium	Goodship & Furness (2022)

Qualifying feature	Sensitivity to Distrubance and Displacement	Source
Ruff	Medium	Goodship & Furness (2022)
Avocet	Medium	Goodship & Furness (2022)
Shoveler	Medium	Goodship & Furness (2022)
Wigeon	High	Goodship & Furness (2022)
Gadwall	Medium	Goodship & Furness (2022)
Lapwing	Medium	Goodship & Furness (2022)
Sanderling	Medium	Goodship & Furness (2022)

2.2.8. Plans and Projects for the In-Combination Assessments

55. The plans and projects set out in Table 2-7 List of Other Projects with Potential for In-Combination Effects on Ornithological Features have been considered within the in-combination assessment for European sites designated for ornithological features, noting that these differ between SPAs according to variation in connectivity (which in turn is dependent on location, breeding season foraging ranges, and distribution and movements in the non-breeding periods).

56. The plans and projects included in this in-combination assessment have been derived in part, from the CEA longlist presented in Volume 3, Appendix 3.4. Each plan or project has been considered on a case-by-case basis for inclusion based upon data confidence, effect pathways and the spatial/temporal scales involved.

57. Assessment of in-combination effects follows each SPA project alone assessment.

Table 2-7 List of Other Projects with Potential for In-Combination Effects on Ornithological Features

Project	Status	Distance from Marine Scheme	Description of Project	Dates of Construction (if Applicable)	Dates of Operation (if Applicable)	Phase Overlap with the Marine Scheme	SPAs Considered for In-Combination Assessment with the Marine Scheme							
							Teesmouth and Cleveland Coast SPA	Northumbria Coast SPA/	Northumberland Marine SPA	Coquet Island SPA	Farne Islands SPA	St Abb's Head to Fast Castle SPA	OFFSAB SPA	Forth Islands SPA
Cambois Connection Onshore Scheme	In planning	0 km (direct physical overlap)	Onshore cables, converter station and associated works to connect into the National Grid substation at Blyth	Construction anticipated to be 2025 to 20310	Anticipated to be operational from 2030for 35 years	Construction and operation and maintenance	x	✓	✓	x	x	x	x	x
BBWF	In planning	0 km (direct physical overlap)	Offshore wind farm	Construction anticipated to be 2025 to 2032	Operational from 2032	Construction and operation and maintenance	x	x	x	x	✓	✓	✓	✓
Scotland to England Green Link (SEGL) 1	In planning	0 km (direct physical overlap)	Transmissio n infrastructure	Construction anticipated to be 2024 to 2027	Operational from ~2027	Construction and operation and maintenance	✓	✓	✓	✓	✓	✓	✓	✓

Project	Status	Distance from Marine Scheme	Description of Project	Dates of Construction (if Applicable)	Dates of Operation (if Applicable)	Phase Overlap with the Marine Scheme	SPAs Considered for In-Combination Assessment with the Marine Scheme							
							Teesmouth and Cleveland Coast SPA	Northumbria Coast SPA/	Northumberland Marine SPA	Coquet Island SPA	Farne Islands SPA	St Abb's Head to Fast Castle SPA	OFFSAB SPA	Forth Islands SPA
Eastern Green Link 2	In planning	3 km	Transmission infrastructure	2026-2029	2029 onward (~40 year operational life)	Construction phase of Marine Scheme overlaps with development's construction phase. O&M phases will overlap.	x	x	✓	x	x	x	✓	x
Blyth Demonstrator Offshore Wind Farm - Phase	Consented	1 km	Offshore wind farm	Complete by 2025	Current lease secured until 2050	Construction phase of Marine Scheme overlaps with development's O&M phase. O&M phases will overlap.	✓	✓	✓	✓	✓	x	x	x
Blyth Demonstration Phase 2 (&3) Cable Corridor	Consented	0 km (direct physical overlap)	Transmission infrastructure	Complete by 2025	Assumed to be consistent with Blyth Demonstrator Offshore Wind Farm - Phase 2	Construction phase of Marine Scheme overlaps spatially and temporally with the development's O&M phase. O&M phases will overlap	✓	✓	✓	✓	✓	x	x	x

Project	Status	Distance from Marine Scheme	Description of Project	Dates of Construction (if Applicable)	Dates of Operation (if Applicable)	Phase Overlap with the Marine Scheme	SPAs Considered for In-Combination Assessment with the Marine Scheme							
							Teesmouth and Cleveland Coast SPA	Northumbria Coast SPA/	Northumberland Marine SPA	Coquet Island SPA	Farne Islands SPA	St Abb's Head to Fast Castle SPA	OFFSAB SPA	Forth Islands SPA
Seagreen 1	Under Construction	5 km	Offshore wind farm	2022 to 2023	2023 to 2048	Construction phase of Marine Scheme overlaps with the O&M phase of the development. O&M phases will overlap.	x	x	x	x	✓	✓	✓	✓
Seagreen 1A Project	Consented	36	Offshore wind farm	2024 to 2026	From 2026, for 25 years	Construction and operation and maintenance	x	x	x	x	✓	✓	✓	✓
Inch Cape Offshore Wind Farm	Under Construction	8 km	Offshore wind farm	2022 to 2025	2025 to 2075	Construction phase of Marine Scheme overlaps with the O&M phase of the development. O&M phases will overlap.	x	x	x	x	✓	✓	✓	✓
Inch Cape OFTO	Consented – pending variation	10	Transmission infrastructure	2022 to 2025	2025 to 2075	Construction phase of Marine Scheme overlaps with the O&M phase of the development. O&M phases will overlap.	x	x	x	x	x	✓	✓	✓

Project	Status	Distance from Marine Scheme	Description of Project	Dates of Construction (if Applicable)	Dates of Operation (if Applicable)	Phase Overlap with the Marine Scheme	SPAs Considered for In-Combination Assessment with the Marine Scheme							
							Teesmouth and Cleveland Coast SPA	Northumbria Coast SPA/	Northumberland Marine SPA	Coquet Island SPA	Farne Islands SPA	St Abb' s Head to Fast Castle SPA	OFFSAB SPA	Forth Islands SPA
Neart Na Gaoithe Offshore Wind	Under Construction	15	Offshore wind farm	2022 to 2023	From 2023, for 25 years	Construction phase of Marine Scheme overlaps with the O&M phase of the development. O&M phases will overlap.	x	x	x	x	x	✓	✓	✓

2.3. Assessment of AEOSI: Teesmouth and Cleveland Coast SPA

2.3.1. European Site Information and Conservation Objectives

58. The Teesmouth and Cleveland Coast SPA is located approximately 45 km south of the Marine Scheme in English Waters and 142 km south of the Marine Scheme in Scottish Waters (Figure 2 in Part One of the RIAA). This assessment is therefore only applicable to the Marine Scheme in English waters.

59. The Teesmouth and Cleveland Coast SPA is a 12 km² complex of coastal habitats centred on the Tees estuary. These include sandflats, mudflats, rocky foreshore, saltmarsh, sand dunes, wet grassland and freshwater lagoons. Together they support internationally important populations of breeding and non-breeding waterbirds. The SPA is a complex of discrete sites, with additional non-designated areas also used for foraging and roosting.

60. There are five Annex I qualifying features and the site qualifies under Article 4.2 by regularly supporting two migratory wader species. The site also supports in excess of 20,000 non-breeding waterbirds including seven additional named components. The potential for LSE has been identified in relation to all qualifying features (Table 2-8**: Details on the qualifying features of the Teesmouth and Cleveland Coast SPA**) with the effect pathways associated with LSE for each of these detailed in Table 2-2 Impact pathways screened into the RIAA for ornithology and set out in the assessment below.

61. The conservation objectives of this SPA are:

- *To ensure that the integrity of the site is maintained or restored as appropriate; and*
- *To ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining:*
    - *The extent and distribution of the habitats of the qualifying features;*
    - *The structure and function of the habitats of the qualifying features;*
    - *The supporting processes on which the habitats of the qualifying features rely;*
    - *The population of each of the qualifying features; and*
    - *The distribution of the qualifying features within the site.*

Table 2-8: Details on the qualifying features of the Teesmouth and Cleveland Coast SPA

Qualifying Feature	Season	Site Condition	Citation Population Size	Potential LSE
Sandwich tern	Non-breeding	Not available	1,900	Yes
Common tern	Breeding	Not available	798	Yes
Little tern	Breeding	Not available	162	Yes
Knot	Non-breeding	Not available	5,509	Yes
Redshank	Non-breeding	Not available	1,648	Yes
Ruff	Non-breeding	Not available	38	Yes

Qualifying Feature	Season	Site Condition	Citation Population Size	Potential LSE
Avocet	Breeding	Not available	36	Yes
Waterbird assemblage	Non-breeding	Not available	26,014	Yes
Shoveler*	Non-breeding	Not available	Not available	Yes
Wigeon*	Non-breeding	Not available	Not available	Yes
Gadwall*	Non-breeding	Not available	Not available	Yes
Lapwing*	Non-breeding	Not available	Not available	Yes
Sanderling*	Non-breeding	Not available	Not available	Yes
Herring gull*	Non-breeding	Not available	Not available	Yes
Black-headed gull*	Non-breeding	Not available	Not available	Yes

*Named components of the assemblage only.

2.3.2. Assessment of Effects on Sandwich Tern

62. The Teesmouth and Cleveland Coast SPA Sandwich tern population is present in late summer, aggregating in important numbers at Coatham Sands, Seal Sands, North Gare Sands/Seaton Snook and Bran Sands when on passage (Wood *et al.,* 2022).

63. The Marine Scheme does not overlap with the Teesmouth and Cleveland Coast SPA, so that potential impacts on its Sandwich tern population will only occur as a result of individuals from the passage aggregation occurring in the area (or vicinity) of the Marine Scheme.

64. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE (INCLUDING NEARSHORE ACTIVITY)

65. Teesmouth and Cleveland Coast SPA is located 45 km south of the Marine Scheme in English waters and 142 km south of the Marine Scheme in Scottish waters. Given that Sandwich terns present in the SPA are on passage, there is potential for Sandwich terns congregating in the Teesmouth and Clevelnad Coast SPA to be present in the Marine Scheme in English waters.

66. When using the marine environment (and not at the breeding colony), Sandwich terns are considered to have a relatively low sensitivity to vessel disturbance. Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign Sandwich tern as ‘2’ on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al.* 2013).

67. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

68. At the Landfall, an additional jack-up barge and guard vessel will be present for up to 15 months at approximately 250m from MLWS. These vessels will be static with limited potential for additional disturbance along the Marine Scheme.

69. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

70. Given that Sandwich tern is rated has having low sensitivity to disturbance from vessels and taking into account the highly localised and temporary nature of the construction activities, with vessels progressively moving along the entire Marine Scheme, there is no potential for construction or decommissioning related disturbance or displacement to lead to an adverse effect on the Teesmouth and Cleveland Coast SPA Sandwich tern population.

CHANGES TO PREY AVAILABILITY

71. Sandwich tern are marine feeders, foraging mainly on sandeel, herring, sprat and whiting. Indirect effects on Sandwich tern may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Teesmouth and Cleveland Coast SPA Sandwich tern population in the short-term.

72. As discussed in Section 2.2.5, during construction there is potential for prey of seabird species to be affected by temporary habitat loss/disturbance and increased SSC and deposition during seabed preparation, cable installation, trenchless technology works, and the installation of cable protection. Prey species may also be affected by underwater noise associated with pre-construction geophysical surveys in particular the use of SBP equipment. These effects, however, are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (as discussed in Volume 2 Chapter 9 Fish and Shellfish Ecology).

73. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

74. There is potential for Sandwich tern associated with the Teesmouth and Cleveland Coast SPA to be present along the southern end of the Marine Scheme and near the Landfall (in English Waters). However, given the highly localised and temporary nature of potential effects on prey species

described above and in Section 2.2.5, together with the availability of alternative foraging habitat in the waters adjacent to the Teesmouth and Cleveland Coast SPA, there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Teesmouth and Cleveland Coast SPA Sandwich tern population.

PROJECT ALONE EFFECTS: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE (INCLUDING NEARSHORE ACTIVITY)

75. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the 35-year lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

76. Given that Sandwich tern is rated has having low sensitivity to vessel disturbance, and that maintenance activities would be limited to a small, discrete section of the Marine Scheme, there is no potential for an adverse effect on the on the Teesmouth and Cleveland Coast SPA Sandwich tern population.

CHANGES IN PREY AVAILABILITY

77. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of cable protection, could affect survival and productivity in the Teesmouth and Cleveland Coast SPA Sandwich tern population for the reasons outlined in Section 2.2.6.

78. Where additional cable protection is required along the Marine Scheme, this will result in permanent subtidal habitat loss. However, as discussed in Section 2.2.6, given the limited presence of key foraging, nursey and spawning grounds for key prey species along all sections of the Marine Scheme (English and Scottish), there is no potential for any adverse effects on the Teesmouth and Cleveland Coast SPA Sandwich tern population due to a reduction in prey availability.

79. Once the Marine Scheme is operational, there is potential for EMF and thermal emissions, although as discussed in Section 2.2.6 these effects are highly localised and are not predicted to have adverse effects on the availability of prey species.

80. There is also potential for underwater noise from geophysical surveys and temporary habitat loss and increased SSC during cable repairs and reburials. However, activities associated with cable repairs and reburials would be substantially less than during construction and decommissioning and are not predicted to adversely affect prey species.

81. Cable protection measures provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels, although overall any change in prey abundance

and/or distribution through the presence of cable protection measures is likely to be very small relative to the area over which SPA Sandwich terns forage.

82. It is therefore considered that there is relatively little potential for the Teesmouth and Cleveland Coast SPA Sandwich tern population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Teesmouth and Cleveland Coast SPA Sandwich tern population.

IN-COMBINATION EFFECTS

83. As detailed above, any effects from the Marine Scheme alone on the Teesmouth and Cleveland Coast SPA Sandwich tern population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.3.3. Assessment of Effects on Common Tern

84. Based on Woodward *et al.,* (2019) (Table 2.5) the mean maximum foraging range (plus 1 SD) for common tern is 26.9 km. On this basis it can be concluded that, given the Marine Scheme is 45 km from the Teesmouth and Cleveland Coast SPA at its closest point, there is no connectivity between the common tern feature of the Teesmouth and Cleveland Coast SPA and the Marine Scheme.

85. The lack of connectivity is confirmed by information presented in Wood *et al.,* (2022) which describes common tern as feeding in the River Tees, associated water bodies and the wider mouth and bay of the Tees Estuary, suggesting that this species is unlikely to be foraging further along the coast.

86. Therefore, no further assessment is required of this feature.

2.3.4. Assessment of Effects on Little Tern

87. Based on Woodward *et al.,* (2019) (Table 2.5) the mean maximum foraging range (plus 1 SD) for little tern is 5 km. On this basis it can be concluded that, given the Marine Scheme is 45 km from the Teesmouth and Cleveland Coast SPA at its closest point, there is no connectivity between the little tern feature of the Teesmouth and Cleveland Coast SPA and the Marine Scheme.

88. Therefore, no further assessment is required of this feature.

2.3.5. Assessment of Effects on Knot, Redshank, Ruff and Avocet

89. The Teesmouth and Cleveland Coast SPA comprises a wide variety of habitats including intertidal sand and mudflats, rocky shore, saltmarsh, freshwater marsh, saline lagoons, sand dunes, estuarine and coastal waters on and around the Tees estuary, which has been considerably modified by human activity (Wood *et al*., 2022).

90. These habitats provide feeding and roosting opportunities for important numbers of waterbirds in winter and during passage periods including in particular common redshank, red knot and ruff which occur in internationally important numbers (Wood *et al.,* 2022). Freshwater and brackish pools also support breeding avocet during summer.

91. Given the distance of the Teesmouth and Cleveland Coast SPA from the Marine Scheme at its closest point (45 km), it can be concluded that there is no connectivity between the knot, redshank, ruff, avocet qualifying features of the Teesmouth and Cleveland Coast SPA.

92. Therefore, no further assessment is required of these features.

2.3.6. Assessment of Shoveler, Wigeon, Gadwall, Lapwing and Sanderling

93. The Teesmouth and Cleveland Coast SPA also qualifies by supporting in excess of 20,000 individual non-breeding waterbirds. In addition to knot, redshank, ruff and avocet, shoveler, wigeon, gadwall, lapwing, sanderling and are identified in the citation as having nationally important populations which contribute to SPA non-breeding waterbird assemblage.

94. Potential impacts of the Marine Scheme alone and in-combination on the non-breeding waterfowl assemblage for the SPA could arise via effects on the individual species within the assemblage feature.

95. Given the distance of the Teesmouth and Cleveland Coast SPA from the Marine Scheme at its closest point (45 km), it can be concluded that there is no connectivity between the shoveler, wigeon, gadwall, lapwing, sanderling additional named components of the SPA non-breeding waterfowl assemblage.

96. Therefore, no further assessment is required of these features.

2.3.7. Assessment of Herring Gull and Black-Headed Gull

97. In addition to the waterbird outlined above, herring gull and black-headed gull are also named components of the non-breeding waterbird assemblage at the Teesmouth and Cleveland Coast SPA.

98. Potential impacts of the Marine Scheme alone and in-combination on the non-breeding waterbird assemblage for the SPA could arise via effects on the individual species within the assemblage feature.

99. Herring gull and black-headed gull are considered to have a relatively low sensitivity to vessel disturbance (Furness *et al*. 2013) and both display opportunistic feeding habits allowing them to exploit a range of alternative habitats (del Hoyo *et al*. 1996).

100. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.3.8. Assessment of the Non-Breeding Waterbird Assemblage

101. The Teesmouth and Cleveland Coast SPA qualifies by supporting in excess of 20,000 individual non-breeding waterbirds. Potential impacts of the Marine Scheme alone and in-combination on the non-

breeding waterbird assemblage for the SPA could arise via effects on the individual species within the assemblage feature.

102. The assessment undertaken for each qualifying feature identifies no potential adverse effects on any of the component species from the project alone or in-combination. Consequently, it is concluded that there will not be an adverse effect on the Teesmouth and Cleveland Coast SPA non-breeding waterbird assemblage, in relation to the Marine Scheme alone or in-combination with other plans and projects.

2.3.9. Site Conclusion

103. It is concluded that there is no potential for an adverse effect on the qualifying features of the Teesmouth and Cleveland Coast SPA due to the effects from the Marine Scheme alone or in-combination with other plans and projects. Consequently, it is concluded that there is no potential for an Adverse Effects on Integrity of the Teesmouth and Cleveland Coast SPA.

2.4. Assessment of AEOSI: Northumbria Coast SPA/Ramsar Site

2.4.1. European Site Information and Conservation Objectives

104. A small section of the Northumbria Coast SPA lies approximately 1 km to the south of the Landfall location, extending along the seaward stretch of the coastal spur occupied by the Port of Blyth (Figure 2 within Part One of the RIAA). The northern most section of the Northumbria Coast SPA is located approximately 48 km south of the Marine Scheme in Scottish waters.

105. The Northumbria Coast SPA is a marine site which covers several discrete sections rocky shoreline with associated boulder and cobble beaches located along the coast between the Tees Estuary in the south, and the Tweed Estuary in the north.

106. The rocky shores and the strand line support high densities of invertebrates which are important food for waterbirds. Purple sandpiper are almost entirely restricted to the rocky shore where they feed on a variety of marine invertebrates but their main food preference is for mussels, winkles and dog whelks (Feare 1996). Turnstones feed on seaweed covered rocks congregating at high tide to roost on the mainland shore or continue to feed on the washed up seaweed on the strandline.

[Redacted]

108. The site qualifies under Article 4.1 by supporting two Annex I breeding seabirds and under Article 4.2 by supporting two regularly occurring migratory wader species. The potential for LSE has been identified in relation to all four species (Table 2.9), with the effect pathways associated with LSE for each of these detailed in Table 2-2 Impact pathways screened into the RIAA for ornithology and set out in the assessment below.

109. The conservation objectives of this SPA are:

- *To ensure that the integrity of the site is maintained or restored as appropriate; and*
- *To ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining*
    - *The extent and distribution of the habitats of the qualifying features;*
    - *The structure and function of the habitats of the qualifying features;*
    - *The supporting processes on which the habitats of the qualifying features rely;*
    - *The population of each of the qualifying features; and*
    - *The distribution of the qualifying features within the site.*

Table 2-9: Details on the qualifying features of the Northumbria Coast SPA

Qualifying Feature	Season	Site Condition	Citation Population Size	Potential LSE
Little tern	Breeding	Not available	80 individuals	Yes
Arctic tern	Breeding	Not available	3,098 individuals	Yes
Purple sandpiper	Non-breeding	Not available	787 individuals	Yes

Qualifying Feature	Season	Site Condition	Citation Population Size	Potential LSE
Turnstone	Non-breeding	Not available	1,739 individual	Yes

2.4.2. Assessment of Effects on Little Tern

[Redacted]

111. It is therefore concluded that no further assessment of the little tern feature of the Northumbria Coast SPA is required.

2.4.3. Assessment of Effects on Arctic Tern

112. In 2015, Natural England prepared a Departmental Brief proposing an amendment to the Northumbria Coast SPA to include Arctic terns as a qualifying feature of the site. The basis for the amendment was that since the designation of the SPA in 2000, the colony of Arctic terns at Newton Links/Long Nanny had undergone a sustained increase, such that numbers in 2015 met qualification criteria supporting 2.9% of the GB population of Arctic tern (Natural England, 2015a).

113. The Marine Scheme does not overlap with the Newton Links/Long Nanny breeding colony within Northumbria Coast SPA, so that potential impacts on its Arctic tern population will only occur as a result of individuals from the colony occurring in the area (or vicinity) of the Marine Scheme. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE (INCLUDING NEARSHORE ACTIVITY)

114. The main breeding colony for Arctic tern within the Northumbria Coast SPA is the colony at Newton Links/Long Nanny (Beadnell Bay) (Natural England, 2015a) which lies approximately 35 km north of the Marine Scheme Landfall. Therefore, although one of the discrete sections of the Northumbria Coast SPA lies within 1 km of the Marine Scheme Landfall in English Waters, this section is not identified as supporting an Arctic tern breeding colony. Given the mean maximum foraging range (plus 1 SD) for Arctic term is 40.5 km (Table 2-5 Breeding season foraging ranges for relevant SPA qualifying seabird species (Woodward *et al.,* 2019)) based on Woodward *et al.,* (2019), it is likely that Arctic tern from the

Newton Links/Long Nanny (Beadnell Bay) breeding colony will forage within the Marine Scheme (English and Scottish Waters).

115. Northumbria Coast SPA is located 45 km south of the Marine Scheme in English waters and 142 km south of the Marine Scheme in Scottish waters. Given that Arctic tern has a mean maximum (plus 1 SD) breeding season foraging range of 40.5 km (Table 2.5) it is it is unlikely that Arctic terns from the Northumbria Coast SPA will occur within the Marine Scheme in nearshore English waters.

116. When using the marine environment (and not at the breeding colony), Arctic tern are considered to have a relatively low sensitivity to vessel disturbance. Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign Arctic tern as '2' on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al.* 2013).

117. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

118. At the Landfall, an additional jack-up barge and guard vessel will be present for up to 15 months at approximately 250 m from MLWS. These vessels will be static with limited potential for additional disturbance along the Marine Scheme.

119. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

120. Given that Arctic tern is rated has having low sensitivity to disturbance from vessels and taking into account the highly localised and temporary nature of the construction activities, with vessels progressively moving along the entire Marine Scheme, there is no potential for construction or decommissioning related disturbance or displacement to lead to an adverse effect on the Northumbria Coast SPA Arctic tern population.

CHANGES TO PREY AVAILABILITY

121. Arctic tern forage on sandeel and other small fish e.g. whiting. Indirect effects on Arctic tern may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Northumbria Coast SPA Arctic tern population in the short-term.

122. As discussed in Section 2.2.5, during construction there is potential for prey of seabird species to be affected by temporary habitat loss/disturbance and increased SSC and deposition during seabed preparation, cable installation, trenchless technology works, and the installation of cable protection. Prey species may also be affected by underwater noise associated with pre-construction geophysical

surveys in particular the use of SBP equipment. These effects, however, are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

123. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

124. There is potential for Arctic tern associated with the Northumbria Coast SPA to be present along the southern end of the Marine Scheme and near the Landfall (in English Waters). However, given the highly localised and temporary nature of potential effects on prey species described above and in Section 2.2.5, together with the availability of alternative foraging habitat in the waters adjacent to the Northumbria Coast SPA, there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Northumbria Coast SPA Arctic tern population.

PROJECT ALONE EFFECTS: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE (INCLUDING NEARSHORE ACTIVITY)

125. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the 35-year lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

126. Given that Arctic tern is rated has having low sensitivity to vessel disturbance, and that maintenance activities would be limited to a small, discrete section of the Marine Scheme, there is no potential for an adverse effect on the on the Northumbria Coast SPA Arctic tern population.

LONG-TERM HABITAT LOSS

127. The main breeding colony for Arctic tern within the Northumbria Coast SPA is the colony at Newton Links/Long Nanny (Beadnell Bay) (Natural England, 2015a) which lies approximately 35 km north of the Marine Scheme Landfall. No long-term habitat loss associated with the breeding colony is therefore predicted.

128. Areas of direct habitat loss for key prey species will be discrete, representing a very low proportion of available foraging habitat for marine birds (0.08% of the fish and shellfish ecology study area). There is therefore no potential for operational related changes in prey availability to lead to an adverse effect on the Northumbria Coast SPA Arctic tern population.

CHANGES IN PREY AVAILABILITY

129. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect survival and productivity in the Northumbria Coast SPA Arctic tern population for the reasons outlined in Section 2.2.6.

130. Where additional cable protection is required along the Marine Scheme, this will result in permanent subtidal habitat loss. However, as discussed in Section 2.2.6, given the limited presence of key foraging, nursey and spawning grounds for key prey species along all sections of the Marine Scheme (English and Scottish), there is no potential for any adverse effects on the Northumbria Coast SPA Arctic tern population due to a reduction in prey availability.

131. Once the Marine Scheme is operational, there is potential for EMF and thermal emissions, although as discussed in Section 2.2.6 these effects are highly localised and are not predicted to have adverse effects on the availability of prey species.

132. There is also potential for underwater noise from geophysical surveys and temporary habitat loss and increased SSC during cable repairs and reburials. However, activities associated with cable repairs and reburials would be substantially less than during construction and decommissioning and are not predicted to adversely affect prey species.

133. Cable protection measures provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels, although overall any change in prey abundance and/or distribution through the presence of cable protection measures is likely to be very small relative to the area over which SPA Arctic tern forage.

134. It is therefore considered that there is relatively little potential for the Northumbria Coast SPA Arctic tern population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Northumbria Coast SPA Arctic tern population.

IN-COMBINATION EFFECTS

135. As detailed above, any effects from the Marine Scheme alone on the Northumbria Coast SPA Arctic tern population resulting from vessel disturbance, long-term habitat loss and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.4.4. Assessment of Effects on Purple Sandpiper

136. Purple sandpiper is a small shorebird which forages on rocky shores, especially around piers, groynes and breakwaters (Wildlife Trust, 2023). The Northumbria Coast SPA includes parts of three artificial pier structures. The man-made structures such as the piers at River Tyne South Pier and Seaham Harbour pier are used as high tide roosts. The tops of the piers and the sides are used by birds

throughout the tidal cycle. The inter-tidal rock platform is an important resource used by wintering purple sandpiper. Purple sandpiper are almost entirely restricted to the rocky shore where they feed on a variety of marine invertebrates but their main food preference is for mussels, winkles and dog whelks (Feare 1996).

137. The closet section of the Northumbria Coast SPA is located 1 km south of the Marine Scheme Landfall. This section of the SPA extends along the seaward stretch of the coastal spur occupied by the Port of Blyth. It is likely that purple sandpiper could be present on areas of rock associated with sections of breakwater and harbour wall structures in this area. Consequently, the focus of the assessment for this SPA population is concerned with all the conservation objectives.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE (INCLUDING NEARSHORE ACTIVITY)

138. Given that purple sandpiper is restricted to the rocky shore it is unlikely to forage beyond MLWS and therefore is unlikely to be affected directly by activities associated with the Marine Scheme, in particular given that trenchless technology (e.g. HDD) will be used to route the Offshore Export Cables from an onshore location (landward of MHWS) beneath the intertidal zone, to exit pits located at a minimum of 250 m seaward of MLWS.

139. Although there is potential for purple sandpiper foraging in rocky sections of the coastline near the Marine Scheme Landfall to be affected by the presence of the jack-up barge and guard vessel offshore, the species is rated as having low sensitivity to disturbance (Goodship and Furness 2022).

140. Given that the Northumbria Coast SPA is located approximately 1 km from the Marine Scheme and that purple sandpiper are not expected to forage in the Marine Scheme boundary and they are not sensitive to vessel disturbance, there is no potential for construction or decommissioning related disturbance or displacement to lead to an adverse effect on the Northumbria Coast SPA purple sandpiper population.

CHANGES TO PREY AVAILABILITY

141. Purple sandpiper are shoreline birds, foraging in the intertidal area (rocky shoreline). Given that the Offshore Export Cables will be installed using trenchless technology (e.g. HDD) at the Marine Scheme Landfall, there is no potential for any direct effect on forging habitat of purple sandpiper. Therefore, there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Northumbria Coast SPA purple sandpiper population.

PROJECT ALONE EFFECTS: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE (INCLUDING NEARSHORE ACTIVITY)

142. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to inspection surveys and potential geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to

one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

143. There is potential that surveys and repairs could be required in the nearshore area near the Marine Scheme Landfall. However, these will be limited to the trenchless technology exit pits which will be located at a minimum of 250 m seaward of MLWS. There will be no direct interactions with, or potential sources of disturbance affecting the intertidal area including areas of rocky foraging habitat for purple sandpiper.

144. Given that purple sandpiper is rated has having low sensitivity to vessel disturbance, the likelihood of the purple sandpiper feature of the Northumbria Coast SPA being adversely affected by cable repairs occurring offshore is very low. Therefore, there is no potential for an adverse effect on the on the Northumbria Coast SPA purple sandpiper population.

LONG-TERM HABITAT LOSS AND CHANGES TO PREY AVAILABILITY

145. Purple sandpiper are shoreline birds, foraging in the intertidal area (rocky shoreline). Given the Offshore Export Cables will be installed using trenchless technology at the Landfall there is no potential for any long-term habitat loss or changes in prey availability associated with rocky shoreline habitat during operation as there will be no interaction with this type of habitat. Therefore, there will be no adverse effect on the Northumbria Coast SPA purple sandpiper population.

IN-COMBINATION EFFECTS

146. As detailed above, any effects from the Marine Scheme alone on the Northumbria Coast SPA purple sandpiper population resulting from vessel disturbance, long-term habitat loss and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.4.5. Assessment of Effects on Turnstone

147. Like purple sandpiper, turnstones are also commonly found along rocky shores and the strandline of sandy beaches. These areas of the coast support high densities of invertebrates which are important food for waterbirds. Turnstones feed on seaweed covered rocks congregating at high tide to roost on the mainland shore or continue to feed on the washed-up seaweed on the strandline.

148. The closet section of the Northumbria Coast SPA is located 1 km south of the Marine Scheme Landfall. This section of the SPA extends along the seaward stretch of the coastal spur occupied by the Port of Blyth. It is likely that turnstone could be present on areas of rock associated with sections of breakwater and harbour wall structures in this area. Consequently, the focus of the assessment for this SPA population is concerned with all the conservation objectives.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE (INCLUDING NEARSHORE ACTIVITY)

149. Given that turnstone is restricted to the rocky shore it is unlikely to forage beyond MLWS and therefore is unlikely to be affected directly by activities associated with the Marine Scheme, in particular given that trenchless technology (HDD) will be used to route the Offshore Export Cables from an onshore location (landward of MHWS) beneath the intertidal zone, to exit pits located at a minimum of 250 m seaward of MLWS.

150. Although there is potential for turnstone foraging in rocky sections of the coastline near the Marine Scheme Landfall to be affected by the presence of the jack-up barge and guard vessel offshore, the species is rated as having low sensitivity to vessel disturbance (Table 2-6 Sensitivity of qualifying features of the SPAs included in this RIAA to vessel disturbance.).

151. Given that the Northumbria Coast SPA is located approximately 1 km from the Marine Scheme and that turnstone are not expected to forage in the Marine Scheme boundary and they are not sensitive to vessel disturbance, there is no potential for construction or decommissioning related disturbance or displacement to lead to an adverse effect on the Northumbria Coast SPA turnstone population.

CHANGES TO PREY AVAILABILITY

152. Turnstones are shoreline birds, foraging along the strandline. Given that the Offshore Export Cables will be installed using trenchless technology (HDD) at the Marine Scheme Landfall, there is no potential for any direct effect on forging habitat of turnstone. Therefore, there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Northumbria Coast SPA turnstone population.

PROJECT ALONE EFFECTS: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE (INCLUDING NEARSHORE ACTIVITY)

153. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to inspection surveys and potential geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

154. There is potential that surveys and repairs could be required in the nearshore area near the Marine Scheme Landfall. However, these will be limited to the trenchless technology exit pits which will be located at a minimum of 250 m seaward of MLWS.. There will be no direct interactions with, or potential sources of disturbance affecting the intertidal area including areas of rocky foraging habitat for turnstone.

155. Given that turnstone is rated has having low sensitivity to vessel disturbance, the likelihood of the turnstone feature of the Northumbria Coast SPA being adversely affected by cable repairs occurring offshore is very low. Therefore, there is no potential for an adverse effect on the on the Northumbria Coast SPA turnstone population.

LOG-TERM HABITAT LOSS AND CHANGES TO PREY AVAILABILITY

156. Turnstones are shoreline birds, foraging along the strandline. Given the Offshore Export Cables will be installed using trenchless technology at the Landfall there is no potential for any long-term habitat loss or changes in prey availability associated with rocky shoreline habitat during operation as there will be no interaction with this type of habitat. Therefore, there will be no adverse effect on the Northumbria Coast SPA turnstone population.

IN-COMBINATION EFFECTS

157. As detailed above, any effects from the Marine Scheme alone on the Northumbria Coast SPA turnstone population resulting from vessel disturbance, long-term habitat loss and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.4.6. Site Conclusion

158. It is concluded that there is no potential for an adverse effect on the qualifying features of the Northumbria Coast SPA due to the effects from the Marine Scheme alone or in-combination with other plans and projects. Consequently, it is concluded that there is no potential for an Adverse Effects on Integrity of the Northumbria Coast SPA.

2.5. Assessment of AEOSI: Northumberland Marine SPA

2.5.1. European Site Information and Conservation Objectives

159. The Northumbria Coast SPA is approximately 38 km from the Marine Scheme in Scottish waters and directly overlaps the Marine Scheme in English Waters (Figure 2 of Part One of the RIAA). This assessment is applicable to the Marine Scheme in both Scottish waters and English waters.

160. The Northumberland Marine SPA provides additional protection to key foraging and maintenance (preening, sleeping, resting) areas for seabirds and terns in waters adjacent to key breeding colonies located along the Northumberland Coast. This includes marine extensions to existing SPAs at the Farne Islands, Coquet Island, Lindisfarne and Northumbria Coast (Long Nanny, Beadnell Bay) (Natural England, 2014) and the inclusion of additional features identified by a review of seabird populations of those SPAs (Natural England, 2015).

161. The northern and southern extents of the coastal boundary of the Northumberland Marine SPA were determined by modelled usage of Sandwich terns foraging from the Farne Islands SPA and Coquet Island SPA respectively (Natural England, 2015). The southern boundary extends to just south of the Blyth Estuary (Natural England, 2015). The seaward extents were determined by, from north to south, the modelled foraging distributions of: Sandwich tern and Arctic terns at the Farne Islands SPA; Arctic terns at Northumbria Coast SPA and Arctic, roseate and Sandwich terns at Coquet Island SPA (Natural England, 2015).

162. The site qualifies under Article 4.1 by supporting five Annex I breeding seabirds and under Article 4.2 by supporting two regularly occurring migratory species. The site also supports in excess of 20,000 non-breeding waterbirds including four additional named components. The potential for LSE has been identified in relation to all features (Table 2.10) with the effect pathways associated with LSE for each of these detailed in Table 2.2 and set out in the assessment below.

163. The conservation objectives of this SPA are:

- *To ensure that the integrity of the site is maintained or restored as appropriate; and*
- *To ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining*
    - *The extent and distribution of the habitats of the qualifying features;*
    - *The structure and function of the habitats of the qualifying features;*
    - *The supporting processes on which the habitats of the qualifying features rely;*
    - *The population of each of the qualifying features; and*
    - *The distribution of the qualifying features within the site.*

Table 2-10: Details on the qualifying features of the Northumberland Marine SPA

Qualifying Feature	Season	Site Condition	Citation Population Size	Potential LSE
Sandwich tern	Breeding	Not available	4,324 individuals	Yes
Common tern	Breeding	Not available	2,572 individuals	Yes

Qualifying Feature	Season	Site Condition	Citation Population Size	Potential LSE
Arctic tern	Breeding	Not available	9,564 individuals	Yes
Roseate tern	Breeding	Not available	160 individuals	Yes
Little tern	Breeding	Not available	90 individuals	Yes
Puffin	Breeding	Not available	108,484 individuals	Yes
Guillemot	Breeding	Not available	65,751 individuals	Yes
Seabird Assemblage	Breeding	Not available	19,549 individuals	Yes
Cormorant*	Breeding	Not available	460 individuals	Yes
Shag*	Breeding	Not available	1,677 individuals	Yes
Black-headed gull*	Breeding	Not available	8,745 individuals	Yes
Kittiwake*	Breeding	Not available	8,667 individuals	Yes

*Named components of the assemblage only.

2.5.2. Assessment of Effects on Sandwich Tern

164. Sandwich tern breeding colonies supported by the Northumberland Marine SPA during the breeding season are located at the Farne Islands SPA and Coquet Island SPA. Consequently, these SPA populations are considered functionally linked to the Northumberland Marine SPA.

165. Potential impacts from the Marine Scheme could arise from vessel disturbance and changes in prey availability during construction, operation and maintenance and decommissioning.

166. The potential impacts on Sandwich tern for each of the SPAs that are functionally linked to the Northumberland Marine SPA have been assessed under each relevant SPA which have been screened into this RIAA. The conclusions for each assessment for the Marine Scheme alone and in-combination with other plans and projects are presented in Table 2.11 and apply to breeding and non-breeding populations across all phases of development.

Table 2-11: Potential for adverse effects on Sandwich tern from SPAs functionally linked to the Northumberland Marine SPA.

SPA	Conclusion alone		Conclusion in-combination	
	Vessel disturbance	Changes in prey availability	Vessel disturbance	Changes in prey availability
Farne Islands (section 2.7.3)	No adverse effect	No adverse effect	No adverse effect	No adverse effect
Coquet Island (section 2.6.5)	No adverse effect	No adverse effect	No adverse effect	No adverse effect

2.5.3. Assessment of Effects on Common Tern

167. Common tern breeding colonies supported by the Northumberland Marine SPA during the breeding season are located at the Farne Islands SPA and Coquet Island SPA. Consequently, these SPA populations are considered functionally linked to the Northumberland Marine SPA.

168. Potential impacts from the Marine Scheme could arise from vessel disturbance and changes in prey availability during construction, operation and maintenance and decommissioning.

169. The potential impacts on common tern for each of the SPAs that are functionally linked to the Northumberland Marine SPA have been assessed under each relevant SPA which have been screened into this RIAA. The conclusions for each assessment for the Marine Scheme alone and in-combination with other plans and projects are presented in Table 2.12 and apply to breeding and non-breeding populations across all phases of development.

Table 2-12: Potential for adverse effects on common tern from SPAs functionally linked to the Northumberland Marine SPA.

SPA	Conclusion alone		Conclusion in-combination	
	Vessel disturbance	Changes in prey availability	Vessel disturbance	Changes in prey availability
Farne Islands (screened out)	No connectivity	No connectivity	No connectivity	No connectivity
Coquet Island (Section 2.6.2)	No adverse effect	No adverse effect	No adverse effect	No adverse effect

2.5.4. Assessment of Effects on Arctic Tern

170. Arctic tern breeding colonies supported by the Northumberland Marine SPA during the breeding season are located at the Farne Islands SPA and Coquet Island SPA. Consequently, these SPA populations are considered functionally linked to the Northumberland Marine SPA.

171. Potential impacts from the Marine Scheme could arise from vessel disturbance and changes in prey availability during construction, operation and maintenance and decommissioning.

172. The potential impacts on Arctic tern for each of the SPAs that are functionally linked to the Northumberland Marine SPA have been assessed under each relevant SPA which have been screened into this RIAA. The conclusions for each assessment for the Marine Scheme alone and in-combination with other plans and projects are presented in Table 2.13 and apply to breeding and non-breeding populations across all phases of development.

Table 2-13: Potential for adverse effects on Arctic tern from SPAs functionally linked to the Northumberland Marine SPA.

SPA	Conclusion alone		Conclusion in-combination	
	Vessel disturbance	Changes in prey availability	Vessel disturbance	Changes in prey availability
Farne Islands (section 2.7.4)	No adverse effect	No adverse effect	No adverse effect	No adverse effect
Coquet Island (section 2.6.3)	No adverse effect	No adverse effect	No adverse effect	No adverse effect

2.5.5. Assessment of Effects on Little Tern

173. The only little tern colonies supported by the Northumberland Marine SPA are located at Lindisfarne SPA and Long Nanny at Northumbria Coast SPA. Given both colonies are well beyond the 5 km mean maximum (plus 1 SD) foraging range for little tern (Woodward *et al.,* 2019), it is highly unlikely that any little terns would forage along the Marine Scheme or near the Marine Scheme Landfall.

174. Therefore, it can be concluded that there is no connectivity between the little tern feature of the Northumberland Marine SPA and the Marine Scheme, and therefore no further assessment of the little tern feature of the Northumberland Marine SPA is required.

2.5.6. Assessment of Effects on Roseate Tern

175. Roseate tern breeding colonies supported by the Northumberland Marine SPA during the breeding season are located at the Farne Islands SPA and Coquet Island SPA. Consequently, these SPA populations are considered functionally linked to the Northumberland Marine SPA.

176. Potential impacts from the Marine Scheme could arise from vessel disturbance and changes in prey availability during construction, operation and maintenance and decommissioning.

177. The potential impacts on roseate tern for each of the SPAs that are functionally linked to the Northumberland Marine SPA have been assessed under each relevant SPA which have been screened into this RIAA. The conclusions for each assessment for the Marine Scheme alone and in-combination with other plans and projects are presented in Table 2.14 and apply to breeding and non-breeding populations across all phases of development.

Table 2-14: Potential for adverse effects on roseate tern from SPAs functionally linked to the Northumberland Marine SPA.

SPA	Conclusion alone		Conclusion in-combination	
	Vessel disturbance	Changes in prey availability	Vessel disturbance	Changes in prey availability
Farne Islands (screened out)	No connectivity	No connectivity	No connectivity	No connectivity
Coquet Island (section 2.6.4)	No adverse effect	No adverse effect	No adverse effect	No adverse effect

2.5.7. Assessment of Effects on Guillemot

178. Guillemot breeding colonies supported by the Northumberland Marine SPA during the breeding season are located at the Farne Islands SPA. Consequently, these SPA populations are considered functionally linked to the Northumberland Marine SPA.

179. Potential impacts from the Marine Scheme could arise from vessel disturbance and changes in prey availability during construction, operation and maintenance and decommissioning.

180. The potential impacts on guillemots for the Farne Islands SPA which is functionally linked to the Northumberland Marine SPA have been separately in this RIAA. The conclusions for each assessment for the Marine Scheme alone and in-combination with other plans and projects are presented in Table **2-15: Potential for adverse effects on guillemot from SPAs functionally linked to the Northumberland Marine SPA.** 2.15 and apply to breeding and non-breeding populations across all phases of development.

Table 2-15: Potential for adverse effects on guillemot from SPAs functionally linked to the Northumberland Marine SPA.

SPA	Conclusion alone		Conclusion in-combination	
	Vessel disturbance	Changes in prey availability	Vessel disturbance	Changes in prey availability
Farne Islands (section 2.7.2)	No adverse effect	No adverse effect	No adverse effect	No adverse effect

2.5.8. Assessment of Effects on Puffin

181. Puffin breeding colonies supported by the Northumberland Marine SPA during the breeding season are located at the Farne Islands SPA and Coquet Island SPA. Consequently, these SPA populations are considered functionally linked to the Northumberland Marine SPA.

182. Potential impacts from the Marine Scheme could arise from vessel disturbance and changes in prey availability during construction, operation and maintenance and decommissioning.

183. The potential impacts on puffin for each of the SPAs that are functionally linked to the Northumberland Marine SPA have been assessed under each relevant SPA which have been screened into this RIAA. The conclusions for each assessment for the Marine Scheme alone and in-combination with other plans and projects are presented in Table 2.16 and apply to breeding and non-breeding populations across all phases of development.

Table 2-16: Potential for adverse effects on puffin from SPAs functionally linked to the Northumberland Marine SPA.

SPA	Conclusion alone		Conclusion in-combination	
	Vessel disturbance	Changes in prey availability	Vessel disturbance	Changes in prey availability
Farne Islands (section 2.7.5)	No adverse effect	No adverse effect	No adverse effect	No adverse effect
Coquet Island (section 2.6.6)	No adverse effect	No adverse effect	No adverse effect	No adverse effect

2.5.9. Assessment of Effects on Cormorant

184. The only cormorant breeding colony supported by the Northumberland Marine SPA during the breeding season is located at the Farne Islands SPA. Consequently, this SPA population is considered functionally linked to the Northumberland Marine SPA.

185. Given that the Marine Scheme in both English and Scottish Waters is beyond the 33.9 km mean maximum (plus 1 SD) breeding foraging range for cormorant (Woodward *et al.,* 2019), this qualifying feature was screened out from further assessment under the Farne Islands SPA.

186. Therefore, no further assessment of cormorant feature of the Northumberland Marine SPA is required.

2.5.10. Assessment of Effects on Shag

187. The only shag breeding colony supported by the Northumberland Marine SPA during the breeding season is located at the Farne Islands SPA. Consequently, this SPA population is considered functionally linked to the Northumberland Marine SPA.

188. Given that the Marine Scheme in both English and Scottish Waters is beyond the 23.7 km mean maximum (plus 1 SD) breeding foraging range for shag (Woodward *et al.,* 2019), this qualifying feature was screened out from further assessment under the Farne Islands SPA.

189. Therefore, no further assessment of shag feature of the Northumberland Marine SPA is required.

2.5.11. Assessment of Effects on Black-Headed Gull

190. Black-headed gull breeding colonies supported by the Northumberland Marine SPA during the breeding season are located at the Farne Islands SPA and Coquet Island SPA. Consequently, these SPA populations are considered functionally linked to the Northumberland Marine SPA.

191. Given that the Marine Scheme in both English and Scottish Waters is beyond the 18.5 km mean maximum (plus 1 SD) breeding foraging range for black-headed gull (Woodward *et al.,* 2019), this qualifying feature was screened out from further assessment under the Farne Islands SPA.

192. Therefore, no further assessment of black-headed gull feature of the Northumberland Marine SPA is required.

2.5.12. Assessment of Effects on Kittiwake

193. Kittiwake breeding colonies supported by the Northumberland Marine SPA during the breeding season are located at the Farne Islands SPA. Consequently, these SPA populations are considered functionally linked to the Northumberland Marine SPA.

194. Potential impacts from the Marine Scheme could arise from vessel disturbance and changes in prey availability during construction, operation and maintenance and decommissioning.

195. The potential impacts on guillemots for the Farne Islands SPA which is functionally linked to the Northumberland Marine SPA have been separately in this RIAA. The conclusions for each assessment for the Marine Scheme alone and in-combination with other plans and projects are presented in Table 2.17 apply to breeding and non-breeding populations across all phases of development.

Table 2-17: Potential for adverse effects on kittiwake from SPAs functionally linked to the Northumberland Marine SPA.

SPA	Conclusion alone		Conclusion in-combination	
	Vessel disturbance	Changes in prey availability	Vessel disturbance	Changes in prey availability
Farne Islands (section 2.7.6)	No adverse effect	No adverse effect	No adverse effect	No adverse effect

2.5.13. Assessment of Effects on the Breeding Seabird Assemblage

196. The breeding seabird assemblage for the Northumberland Marine SPA is a qualifying feature on the basis of the SPA supporting 19,549 individual seabirds, including those species assessed above.

197. Potential impacts of the Marine Scheme alone and in-combination on the breeding seabird assemblage for the SPA could arise via effects on the individual species within the assemblage feature.

198. The assessment undertaken for each qualifying feature identifies no potential adverse effects on any of the component species from the project alone or in-combination. Consequently, it is concluded that there will not be an adverse effect on the Northumberland Marine SPA breeding seabird assemblage, in relation to the Marine Scheme alone or in-combination with other plans and projects.

2.5.14. Site Conclusion

199. It is concluded that there is no potential for an adverse effect on the qualifying features of the Northumberland Marine SPA due to the effects from the Marine Scheme alone or in-combination with other plans and projects. Consequently, it is concluded that there is no potential for an Adverse Effects on Integrity of the Northumberland Marine SPA.

2.6. Assessment of AEOSI: Coquet Island SPA

2.6.1. European Site Information and Conservation Objectives

200. Coquet Island SPA is located 1 km off the coast of Northumberland in northeast England and lies approximately 79 km south of the Marine Scheme in Scottish waters and 16 km northwest of the Marine Scheme in English Waters (Figure 2 in Part One of the RIAA).

201. Coquet Island is a small, flat-topped island with a plateau extent of approximately seven hectares. The island consists of sandy soil and peat over a soft sandstone base. Low cliffs of approximately 2.4-3.7m high result from earlier quarrying. Surrounding the island is a rocky upper shore and intertidal covering 15 ha when fully exposed. There is a sandy beach on the southwest of the island and the southeast corner is shingle and rock. A small, shallow, man-made well lies in the centre of the plateau, which is fed by non-potable surface water. Where nutrient input from seabird colonies is greatest, there are dense stands of taller species, including nettles. These provide cover for some of the nesting terns (Stroud *et al.* 2001).

202. The site qualifies under Article 4.1 by supporting four Annex I breeding seabirds. The site also supports in excess of 20,000 non-breeding waterbirds including six additional named components. The potential for LSE has been identified in relation to some features with the effect pathways associated with LSE for each of these detailed in Table 2.2 and set out in the assessment below, excluding black headed gull and fulmar which have subsequently been screened out based on their sensitivity to potential impacts from the development (e.g. Garthe and Hüppop 2004, Furness et al. 2013), an approach that was also taken for BBWF RIAA (BBWF, 2022a).

203. The conservation objectives of this SPA are:

- *To ensure that the integrity of the site is maintained or restored as appropriate; and*
- *To ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining*
    - *The extent and distribution of the habitats of the qualifying features;*
    - *The structure and function of the habitats of the qualifying features;*
    - *The supporting processes on which the habitats of the qualifying features rely;*
    - *The population of each of the qualifying features; and*
- The distribution of the qualifying features within the site.

Table 2-18: Details on the qualifying features of the Coquet Island SPA

Qualifying Feature	Season	Site Condition	Citation Population Size	Potential LSE
Common tern	Breeding	Not available	2,378 individuals	Yes
Arctic tern	Breeding	Not available	2,460 individuals	Yes
Roseate tern	Breeding	Not available	160 individuals	Yes
Sandwich tern	Breeding	Not available	2,600 individuals	Yes
Atlantic puffin*	Breeding	Not available	31,686 individuals	Yes
Black headed gull*	Breeding	Not available	7,772 individuals	No
Kittiwake*	Breeding	Not available	Not available	Yes
Fulmar*	Breeding	Not available	Not available	No
Herring gull*	Breeding	Not available	Not available	Yes
Lesser black-backed gull*	Breeding	Not available	Not available	Yes
Seabird assemblage	Breeding	Not available	47,662 individuals	Yes

*Named components of the assemblage only.

2.6.2. Assessment of Effects on Common Tern

204. Coquet Island is the most important site in the UK for breeding common tern. When Coquet Island was classified as an SPA in 1985 it supported 1,100 pairs of common tern. The most recent 5-year mean (based on counts from 2010 – 2014) was 1,189 pairs of which represents 11.89% of the GB breeding population (Natural England, 2015c).

205. The Marine Scheme does not overlap with the Coquet Island SPA, so that potential impacts on its common tern population will only occur as a result of individuals from the Coquet Islands SPA colony occurring in the area (or vicinity) of the Marine Scheme.

206. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

207. Coquet Island is located 16 km northwest of the Marine Scheme in English Waters at the closest point. This is within the mean maximum (plus 1 SD) foraging range of common tern (26.9 km), which suggest common tern qualifying feature of the Coquet Island SPA could be present along the Marine Scheme in English Waters.

208. When using the marine environment (and not at the breeding colony), common tern are considered to have a relatively low sensitivity to vessel disturbance. Thus, reviews of the sensitivity of different

seabird species to disturbance from vessels assign common tern as '2' on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al.* 2013).

209. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

210. At the Landfall, an additional jack-up barge and guard vessel will be present for up to 15 months at an approximate distance of between 250 m from MLWS. These vessels will be static with limited potential for additional disturbance along the Marine Scheme.

211. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

212. Given that common tern is rated has having low sensitivity to disturbance from vessels and taking into account the highly localised and temporary nature of the construction activities, with vessels progressively moving along the entire Marine Scheme, there is no potential for construction or decommissioning related disturbance or displacement to lead to an adverse effect on the Coquet Island SPA common tern population.

CHANGES TO PREY AVAILABILITY

213. As discussed in Section 2.2.5, during construction there is potential for prey of seabird species to be affected by temporary habitat loss/disturbance and increased SSC and deposition during seabed preparation, cable installation, HDD works, and the installation of cable protection. Prey species may also be affected by underwater noise associated with pre-construction geophysical surveys in particular the use of SBP equipment. These effects, however, are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

214. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

215. Given the highly localised and temporary nature of potential effects on prey species described above and in Section 2.2.5, together with the availability of alternative foraging habitat in the waters adjacent to Coquet Island SPA, there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Coquet Island SPA common tern population.

PROJECT ALONE EFFECTS: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE (INCLUDING NEARSHORE ACTIVITY)

216. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the 35-year lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

217. Given that common tern is rated has having low sensitivity to vessel disturbance, and that maintenance activities would be limited to a small, discrete section of the Marine Scheme, there is no potential for an adverse effect on the on the Coquet Island SPA common tern population.

CHANGES IN PREY AVAILABILITY

218. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect survival and productivity in the Coquet Island SPA common tern population for the reasons outlined in Section 2.2.6.

219. Where additional cable protection is required along the Marine Scheme, this will result in permanent subtidal habitat loss. However, as discussed in Section 2.2.6, given the limited presence of key foraging, nursey and spawning grounds for key prey species along all sections of the Marine Scheme (English and Scottish), there is no potential for any adverse effects on the Coquet Island SPA common tern population due to a reduction in prey availability.

220. Once the Marine Scheme is operational, there is potential for EMF and thermal emissions, although as discussed in Section 2.2.6 these effects are highly localised and are not predicted to have adverse effects on the availability of prey species.

221. There is also potential for underwater noise from geophysical surveys and temporary habitat loss and increased SSC during cable repairs and reburials. However, activities associated with cable repairs and reburials would be substantially less than during construction and decommissioning and are not predicted to adversely affect prey species.

222. Cable protection measures provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels, although overall any change in prey abundance and/or distribution through the presence of cable protection measures is likely to be very small relative to the area over which Coquet Island SPA common tern forage.

223. It is therefore considered that there is relatively little potential for the Coquet Island SPA common tern population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently,

it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Coquet Island SPA common tern population.

IN-COMBINATION EFFECTS

224. As detailed above, any effects from the Marine Scheme alone on the Coquet Island SPA common tern population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.6.3. Assessment of Effects on Arctic Tern

225. At the time of classification (1985) Coquet Island supported 700 pairs of Arctic tern and was ranked the 11th most important site in the UK for the species (Stroud *et al*. 2001). The most recent 5-year mean of 1,230 pairs represents 2.32% of the GB breeding population, resulting in the Coquet Island now being ranked as the 4th most important site for the species in the UK (Natural England, 2015c).

226. The Marine Scheme does not overlap with the Coquet Island SPA, so that potential impacts on its Arctic tern population will only occur as a result of individuals from the Coquet Islands SPA colony occurring in the area (or vicinity) of the Marine Scheme.

227. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

228. Coquet Island is located 16 km northwest of the Marine Scheme in English Waters at the closest point. This is within the mean maximum (plus 1 SD) foraging range of Arctic tern (40.5 km), which suggest Arctic tern qualifying feature of the Coquet Island SPA could be present along the Marine Scheme in English Waters.

229. When using the marine environment (and not at the breeding colony), Arctic tern are considered to have a relatively low sensitivity to vessel disturbance. Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign common tern as '2' on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al.* 2013).

230. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively

move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

231. At the Landfall, an additional jack-up barge and guard vessel will be present for up to 15 months at an approximate distance of between 250 m from MLWS. These vessels will be static with limited potential for additional disturbance along the Marine Scheme.

232. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

233. Given that Arctic tern is rated has having low sensitivity to disturbance from vessels and taking into account the highly localised and temporary nature of the construction activities, with vessels progressively moving along the entire Marine Scheme, there is no potential for construction or decommissioning related disturbance or displacement to lead to an adverse effect on the Coquet Island SPA Arctic tern population.

CHANGES TO PREY AVAILABILITY

234. As discussed in Section 2.2.5, during construction there is potential for prey of seabird species to be affected by temporary habitat loss/disturbance and increased SSC and deposition during seabed preparation, cable installation, HDD works, and the installation of cable protection. Prey species may also be affected by underwater noise associated with pre-construction geophysical surveys in particular the use of SBP equipment. These effects, however, are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

235. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

236. Given the highly localised and temporary nature of potential effects on prey species described above and in Section 2.2.5, together with the availability of alternative foraging habitat in the waters adjacent to Coquet Island SPA, there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Coquet Island SPA Arctic tern population.

PROJECT ALONE EFFECTS: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

237. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the 35-year lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in

cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

238. Given that common tern is rated has having low sensitivity to vessel disturbance, and that maintenance activities would be limited to a small, discrete section of the Marine Scheme, there is no potential for an adverse effect on the on the Coquet Island SPA Arctic tern population.

CHANGES IN PREY AVAILABILITY

239. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect survival and productivity in the Coquet Island SPA Arctic tern population for the reasons outlined in Section 2.2.6.

240. Where additional cable protection is required along the Marine Scheme, this will result in permanent subtidal habitat loss. However, as discussed in Section 2.2.6, given the limited presence of key foraging, nursey and spawning grounds for key prey species along all sections of the Marine Scheme (English and Scottish), there is no potential for any adverse effects on the Coquet Island SPA Arctic tern population due to a reduction in prey availability.

241. Once the Marine Scheme is operational, there is potential for EMF and thermal emissions, although as discussed in Section 2.2.6 these effects are highly localised and are not predicted to have adverse effects on the availability of prey species.

242. There is also potential for underwater noise from geophysical surveys and temporary habitat loss and increased SSC during cable repairs and reburials. However, activities associated with cable repairs and reburials would be substantially less than during construction and decommissioning and are not predicted to adversely affect prey species.

243. Cable protection measures provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels, although overall any change in prey abundance and/or distribution through the presence of cable protection measures is likely to be very small relative to the area over which Coquet Island SPA Arctic tern forage.

244. It is therefore considered that there is relatively little potential for the Coquet Island SPA Arctic tern population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Coquet Island SPA Arctic tern population.

IN-COMBINATION EFFECTS

245. As detailed above, any effects from the Marine Scheme alone on the Coquet Island SPA Arctic tern population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.6.4. Assessment of Effects on Roseate Tern

246. Based on evidence presented in the Coquet Island Department Brief (Natural England, 2015c), Coquet Island is the most important site for roseate tern in the UK. In 1985 Coquet Island supported 29 pairs of breeding roseate terns (Stroud *et al*. 2001). This increased to 80 pairs in the most recent 5-year mean count (2010 to 2014) which represents 93.02% of the GB breeding population.

247. The Marine Scheme does not overlap with the Coquet Island SPA, so that potential impacts on its roseate tern population will only occur as a result of individuals from the Coquet Islands SPA colony occurring in the area (or vicinity) of the Marine Scheme.

248. Consequently, the main focus of the assessment for this SPA population is concerned with the Conservation Objective *maintain the population of each of the qualifying features* because the other conservation objectives either apply to the site itself in that they relate to supporting habitats within the SPA itself, and not to areas beyond the boundary, or are encompassed by the assessment of this first Conservation Objective (as for *maintain the distribution of the qualifying features within the site*).

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

249. Coquet Island is located 16 km northwest of the Marine Scheme in English Waters at the closest point. This is within the mean maximum (plus 1 SD) foraging range of roseate tern (23.2 km), which suggest roseate tern qualifying feature of the Coquet Island SPA could be present along the Marine Scheme in English Waters.

250. When using the marine environment (and not at the breeding colony), roseate tern are considered to have a relatively low sensitivity to vessel disturbance. Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign common tern as '2' on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al.* 2013).

251. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

252. At the Landfall, an additional jack-up barge and guard vessel will be present for up to 15 months at an approximate distance of between 250 m from MLWS. These vessels will be static with limited potential for additional disturbance along the Marine Scheme.

253. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

254. Given that roseate tern is rated has having low sensitivity to disturbance from vessels and taking into account the highly localised and temporary nature of the construction activities, with vessels progressively moving along the entire Marine Scheme, there is no potential for construction or decommissioning related disturbance or displacement to lead to an adverse effect on the Coquet Island SPA roseate tern population.

CHANGES TO PREY AVAILABILITY

255. As discussed in Section 2.2.5, during construction there is potential for prey of seabird species to be affected by temporary habitat loss/disturbance and increased SSC and deposition during seabed preparation, cable installation, HDD works, and the installation of cable protection. Prey species may also be affected by underwater noise associated with pre-construction geophysical surveys in particular the use of SBP equipment. These effects, however, are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

256. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

257. Given the highly localised and temporary nature of potential effects on prey species described above and in Section 2.2.5, together with the availability of alternative foraging habitat in the waters adjacent to Coquet Island SPA, there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Coquet Island SPA roseate tern population.

PROJECT ALONE EFFECTS: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE (INCLUDING NEARSHORE ACTIVITY)

258. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the 35-year lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

259. Given that roseate tern is rated has having low sensitivity to vessel disturbance, and that maintenance activities would be limited to a small, discrete section of the Marine Scheme, there is no potential for an adverse effect on the on the Coquet Island SPA roseate tern population.

CHANGES IN PREY AVAILABILITY

260. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect survival and productivity in the Coquet Island SPA roseate tern population for the reasons outlined in Section 2.2.6.

261. Where additional cable protection is required along the Marine Scheme, this will result in permanent subtidal habitat loss. However, as discussed in Section 2.2.6, given the limited presence of key foraging, nursey and spawning grounds for key prey species along all sections of the Marine Scheme (English and Scottish), there is no potential for any adverse effects on the Coquet Island SPA roseate tern population due to a reduction in prey availability.

262. Once the Marine Scheme is operational, there is potential for EMF and thermal emissions, although as discussed in Section 2.2.6 these effects are highly localised and are not predicted to have adverse effects on the availability of prey species.

263. There is also potential for underwater noise from geophysical surveys and temporary habitat loss and increased SSC during cable repairs and reburials. However, activities associated with cable repairs and reburials would be substantially less than during construction and decommissioning and are not predicted to adversely affect prey species.

264. Cable protection measures provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels, although overall any change in prey abundance and/or distribution through the presence of cable protection measures is likely to be very small relative to the area over which Coquet Island SPA roseate tern forage.

265. It is therefore considered that there is relatively little potential for the Coquet Island SPA roseate tern population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Coquet Island SPA roseate tern population.

In-Combination Effects

266. As detailed above, any effects from the Marine Scheme alone on the Coquet Island SPA roseate tern population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.6.5. Assessment of Effects on Sandwich Tern

267. Based on evidence presented in the Coquet Island SPA Department Brief (Natural England, 2015c) Coquet Island is the third most important site for breeding populations of Sandwich tern in the UK. At the time of classification (1985) Coquet Island supported 1,500 pairs of Sandwich tern and was ranked

as the third most important site. This ranking has not changed despite a slight decrease in the most recent 5-year mean to 1,300 pairs. This represents 11.82% of the GB breeding population.

268. The Marine Scheme does not overlap with the Coquet Island SPA, so that potential impacts on its Sandwich tern population will only occur as a result of individuals from the Coquet Islands SPA colony occurring in the area (or vicinity) of the Marine Scheme.

269. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

270. Coquet Island is located 16 km northwest of the Marine Scheme in English Waters at the closest point. This is within the mean maximum (plus 1 SD) foraging range of Sandwich tern (57.5 km), which suggest Sandwich tern qualifying feature of the Coquet Island SPA could be present along the Marine Scheme in English Waters.

271. When using the marine environment (and not at the breeding colony), Sandwich tern are considered to have a relatively low sensitivity to vessel disturbance. Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign common tern as '2' on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al.* 2013).

272. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

273. At the Landfall, an additional jack-up barge and guard vessel will be present for up to 15 months at an approximate distance and between 250 m from MLWS. These vessels will be static with limited potential for additional disturbance along the Marine Scheme.

274. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

275. Given that Sandwich tern is rated has having low sensitivity to disturbance from vessels and taking into account the highly localised and temporary nature of the construction activities, with vessels progressively moving along the entire Marine Scheme, there is no potential for construction or decommissioning related disturbance or displacement to lead to an adverse effect on the Coquet Island SPA Sandwich tern population.

CHANGES TO PREY AVAILABILITY

276. As discussed in Section 2.2.5, during construction there is potential for prey of seabird species to be affected by temporary habitat loss/disturbance and increased SSC and deposition during seabed preparation, cable installation, HDD works, and the installation of cable protection. Prey species may also be affected by underwater noise associated with pre-construction geophysical surveys in particular the use of SBP equipment. These effects, however, are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

277. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

278. Given the highly localised and temporary nature of potential effects on prey species described above and in Section 2.2.5, together with the availability of alternative foraging habitat in the waters adjacent to Coquet Island SPA, there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Coquet Island SPA Sandwich tern population.

PROJECT ALONE EFFECTS: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE (INCLUDING NEARSHORE ACTIVITY)

279. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the 35-year lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

280. Given that Sandwich tern is rated has having low sensitivity to vessel disturbance, and that maintenance activities would be limited to a small, discrete section of the Marine Scheme, there is no potential for an adverse effect on the on the Coquet Island SPA Sandwich tern tern population.

CHANGES IN PREY AVAILABILITY

281. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect survival and productivity in the Coquet Island SPA Sandwich tern population for the reasons outlined in Section 2.2.6.

282. Where additional cable protection is required along the Marine Scheme, this will result in permanent subtidal habitat loss. However, as discussed in Section 2.2.6, given the limited presence of key foraging, nursey and spawning grounds for key prey species along all sections of the Marine Scheme

(English and Scottish), there is no potential for any adverse effects on the Coquet Island SPA Sandwich tern population due to a reduction in prey availability.

283. Once the Marine Scheme is operational, there is potential for EMF and thermal emissions, although as discussed in Section 2.2.6 these effects are highly localised and are not predicted to have adverse effects on the availability of prey species.

284. There is also potential for underwater noise from geophysical surveys and temporary habitat loss and increased SSC during cable repairs and reburials. However, activities associated with cable repairs and reburials would be substantially less than during construction and decommissioning and are not predicted to adversely affect prey species.

285. Cable protection measures provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels, although overall any change in prey abundance and/or distribution through the presence of cable protection measures is likely to be very small relative to the area over which Coquet Island SPA Sandwich tern forage.

286. It is therefore considered that there is relatively little potential for the Coquet Island SPA Sandwich tern population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Coquet Island SPA Sandwich tern population.

IN-COMBINATION EFFECTS

287. As detailed above, any effects from the Marine Scheme alone on the Coquet Island SPA Sandwich tern population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.6.6. Assessment of Effects on Puffin

288. During the breeding season, the Coquet Island SPA supports 31,686 breeding adult puffins (Natural England 2015).

289. The Marine Scheme does not overlap with the Coquet Island SPA, so that potential impacts on its puffin population will only occur as a result of individuals from the Coquet Islands SPA colony occurring in the area (or vicinity) of the Marine Scheme.

290. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

291. Based on the mean max (plus 1SD) foraging range for puffin 265.4 km (Table 2-5 Breeding season foraging ranges for relevant SPA qualifying seabird species (Woodward *et al.,* 2019)) it is likely that breeding puffin from Coquet Island SPA will be present along the entire Marine Scheme in both English and Scottish Waters.

292. During the non-breeding periods, puffin migrate rapidly from their UK breeding areas dispersing widely across north-west European seas and the Atlantic (Wernham *et al*. 2002, Harris and Wanless 2011, Jessopp *et al* 2013), such that there is no potential for effects of construction-related disturbance.

293. When using the marine environment (and not at the breeding colony), puffins are considered to have a relatively low sensitivity to such sources of direct disturbance. Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign puffin as '2' on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al.* 2013).

294. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

295. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

296. Given the relatively low sensitivity of puffin to disturbance effects, the relatively small areas that will be subject to activities with the potential to result in disturbance at any given time during the construction period and the fact that these potential effects will be temporary, it is considered that there is no potential for construction or decommissioning related disturbance or displacement to lead to an adverse effect on the Coquet Island SPA puffin population.

CHANGES TO PREY AVAILABILITY

297. Sandeels are key prey for puffins, with a range of other species taken including clupeids and gadids (del Hoyo *et al*., 1996). Indirect effects on puffins may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Coquet Island SPA puffin population in the short-term.

298. During construction there is potential for prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

299. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

300. Given the highly localised and temporary nature of potential effects on prey species described above and in Section 2.2.5, together with the availability of alternative foraging habitat, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Coquet Island SPA puffin population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

301. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the 35-year lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

302. Given that puffin are considered to have low sensitivity to vessel disturbance, it is therefore considered that that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Coquet Island SPA puffin population.

CHANGES TO PREY AVAILABILITY

303. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect survival and productivity in the Coquet Island SPA puffin population for the reasons outlined in Section 2.2.6.

304. Where additional cable protection is required along the Marine Scheme, this will result in permanent subtidal habitat loss. However, as discussed in Section 2.2.6, given the limited presence of key foraging, nursey and spawning grounds for key prey species along all sections of the Marine Scheme (English and Scottish), there is no potential for any adverse effects on the Coquet Island SPA puffin population due to a reduction in prey availability.

305. Once the Marine Scheme is operational, there is potential for EMF and thermal emissions, although as discussed in Section 2.2.6 these effects are highly localised and are not predicted to have adverse effects on the availability of prey species.

306. There is also potential for underwater noise from geophysical surveys and temporary habitat loss and increased SSC during cable repairs and reburials. However, activities associated with cable repairs and reburials would be substantially less than during construction and decommissioning and are not predicted to adversely affect prey species.

307. Cable protection measures provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels, although overall any change in prey abundance and/or distribution through the presence of cable protection measures is likely to be very small relative to the area over which SPA puffins forage.

308. It is therefore considered that there is relatively little potential for the Coquet Island SPA puffin population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Coquet Island SPA puffin population.

IN-COMBINATION EFFECTS

309. As detailed above, any effects from the Marine Scheme alone on the Coquet Island SPA puffin population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.6.7. Assessment of Effects on Kittiwake

310. The Marine Scheme does not overlap with the Coquet Island SPA, so that potential impacts on its kittiwake population will only occur as a result of individuals from the Coquet Islands SPA colony occurring in the area (or vicinity) of the Marine Scheme.

311. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

312. Coquet Island is located 16 km north-west of the Marine Scheme in English Waters at the closest point and 79 km south of the Marine Scheme in Scottish Waters at the closest point. Given that kittiwake has a mean maximum (plus 1 SD) foraging range of 300.6 km (Table 2-5 Breeding season foraging ranges for relevant SPA qualifying seabird species (Woodward *et al.,* 2019)) it is highly likely that kittiwake will be present along all sections of the Marine Scheme during the breeding season.

Therefore, there is potential for the kittiwake feature of the Coquet Island SPA to be affected by disturbance associated with construction activities and vessels.

313. Tracking data (and associated modelling of foraging distributions) for kittiwake appear to suggest that the Marine Scheme is beyond waters that are heavily used by birds from Coquet Island SPA during the breeding season (Wakefield *et al.* 2017).

314. During the non-breeding periods, kittiwake distribution is not constrained by the location of the breeding colonies and birds from the SPA population are likely to occur across large expanses of oceanic and maritime waters (Frederiksen *et al.* 2012, Furness 2015) and the potential for effects of construction-related disturbance during the non-breeding season is lower than during the breeding season.

315. When using the marine environment (and not at the breeding colony), kittiwakes are considered to have a relatively low sensitivity to such sources of direct disturbance. Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign kittiwake as '2' on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al.* 2013).

316. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

317. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

318. Given that kittiwake have low sensitivity to vessel disturbance together with the highly localised and temporary nature of the construction activities, the limited number of vessels that will be present on site at any one time and that vessels will move progressively along the entire Marine Scheme during the construction period, it is considered that there is no potential for construction or decommissioning related vessel disturbance to have an adverse effect on the Coquet Island SPA kittiwake population.

CHANGES IN PREY AVAILABILITY

319. Key prey species for kittiwakes include sandeel and sprat (del Hoyo *et al.*, 1996). Indirect effects on kittiwakes may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Coquet Island SPA kittiwake population in the short-term.

320. During construction there is potential for prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly

localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (Volume 2 Chapter 9 Fish and Shellfish Ecology).

321. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

322. Given the highly localised and temporary nature of potential effects on prey species described above and in Section 2.2.5, together with the availability of alternative foraging habitat, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Coquet Island SPA kittiwake population.

PROJECT ALONE EFFECTS: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

323. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the 35-year lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

324. Given the low sensitivity of kittiwake to disturbance effects at sea (Garthe and Hüppop 2004; Furness *et al*. 2013), the relatively small areas relative to the species' foraging range that will be subject intermittently to potentially disturbing activities (Woodward *et al*. 2019), and the fact that these potential effects will be reduced compared to the construction and decommissioning phases, it is considered that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Coquet Island SPA kittiwake population.

CHANGES IN PREY AVAILABILITY

325. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect kittiwake survival and productivity in the Farne Islands SPA kittiwake population.

326. Where additional cable protection is required along the Marine Scheme, this will result in permanent subtidal habitat loss. However, as discussed in Section 2.2.6, given the limited presence of key foraging, nursey and spawning grounds for key prey species along all sections of the Marine Scheme (English and Scottish), there is no potential for any adverse effects on the Farne Islands SPA kittiwake populations due to a reduction in prey availability.

327. Once the Marine Scheme is operational, there is potential for EMF and thermal emissions, although as discussed in Section 2.2.6 these effects are highly localised and are not predicted to have adverse effects on the availability of prey species.

328. There is also potential for underwater noise from geophysical surveys and temporary habitat loss and increased SSC during cable repairs and reburials. However, activities associated with cable repairs and reburials would be substantially less than during construction and decommissioning and are not predicted to adversely affect prey species.

329. Cable protection measures provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels. Whilst there is mounting evidence of potential benefits of artificial structures in the main environment (Birchenough and Degrae 2020), the statistical significance of such benefits and details about trophic interactions, particularly for seabirds, remain largely unknown (Peschko *et al*., 2020; BOWL 2021a, 2021b; Scott, 2022). Overall, any change in prey abundance and/or distribution through the presence of cable protection measures is likely to be very small relative to the area over which SPA kittiwakes forage.

330. It is therefore considered that there is relatively little potential for the Coquet Island SPA kittiwake population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Coquet Island SPA kittiwake population.

IN-COMBINATION EFFECTS

331. As detailed above, any effects from the Marine Scheme alone on the Coquet Island SPA kittiwake population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.6.8. Assessment of Effects on Lesser Black-Backed Gull

332. The Marine Scheme does not overlap with Coquet Island SPA, so that potential impacts on its lesser black-backed gull population will only occur as a result of individuals from the Farne Islands SPA colony occurring in the area (or vicinity) of the Marine Scheme.

333. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

334. Coquet Island is located 16 km north-west of the Marine Scheme in English Waters at the closest point and 79 km south of the Marine Scheme in Scottish Waters at the closest point. Given that the lesser

black-backed gull has a mean max (plus 1DS) foraging range of 236 km (Table 2-5 Breeding season foraging ranges for relevant SPA qualifying seabird species (Woodward *et al.,* 2019)) it is likely that lesser black-backed gull will be present along all sections of the Marine Scheme during the breeding season.

335. However, lesser black-backed gull is considered to be relative insensitive to such disturbance effects (Garthe and Hüppop 2004, Furness *et al.* 2013), and a conclusion of no LSE was reached in relation to disturbance and displacement for the BBWF HRA Stage One Screening Report (BBWFL, 2021).

336. On this basis it can be concluded that there is no potential for construction or decommissioning related vessel disturbance to have an adverse effect on the Coquet Island SPA lesser black-backed gull population

CHANGES IN PREY AVAILABILITY

337. Lesser black-backed gull have a highly opportunistic diet (del Hoyo *et al*., 1996), utilising terrestrial, intertidal and marine habitats to forage for a wide variety of prey species including invertebrates, small fish and carrion (including fishery discards). Indirect effects on lesser black-backed gulls may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Coquet Island SPA lesser black-backed gull population in the short-term.

338. During construction there is potential for prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (Volume 2 Chapter 9 Fish and Shellfish Ecology).

339. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

340. Given their wide-ranging foraging behaviour and plasticity in foraging habitat and diet (del Hoyo *et al*., 1996), together with any effects being intermittent, spatially-restricted and temporary in nature, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Coquet Island SPA lesser black-backed gull population.

PROJECT ALONE EFFECTS: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

341. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to inspection surveys and potential geophysical surveys (to check the Offshore Export Cables for any evidence of exposure or occurrence of freespans) and any cable repair or reburial works as outlined in Table 2-3 MDS specific to the assessment .

342. Lesser black-backed gull is considered to be relative insensitive to disturbance away from the breeding colony (Garthe and Hüppop 2004, Furness *et al.* 2013), and a conclusion of no LSE was reached in relation to disturbance and displacement for the BBWF HRA Stage One Screening Report (BBWFL, 2021). On this basis it is considered that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Coquet Island SPA lesser black-backed gull population.

CHANGES IN PREY AVAILABILITY

343. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect lesser black-backed gull survival and productivity in the Coquet Island SPA lesser black-backed gull population.

344. However, lesser black-backed gull has flexible foraging habits and a highly opportunistic diet (del Hoyo *et al*., 1996), which enables them to forage for a wide variety of prey species including invertebrates, small fish and carrion (including fishery discards).

345. It is therefore considered that there is relatively little potential for the Coquet Island SPA lesser black-backed gull population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Coquet Island SPA lesser black-backed gull population.

IN-COMBINATION EFFECTS

346. As detailed above, any effects from the Marine Scheme alone on the Coquet Island SPA lesser black-backed gull population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.6.9. Assessment of Effects on Herring Gull

347. The Marine Scheme does not overlap with the Coquet Island SPA, so that potential impacts on its herring gull population will only occur as a result of individuals from the Coquet Island SPA colony occurring in the area (or vicinity) of the Marine Scheme.

348. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

349. Coquest Island is located 16 km north-west of the Marine Scheme in English Waters at the closest point and 79 km south of the Marine Scheme in Scottish Waters at the closest point. Given that the herring gull as a mean max (plus 1DS) foraging range of 236 km (Table 2-5 Breeding season foraging ranges for relevant SPA qualifying seabird species (Woodward *et al.,* 2019) it is likely that herring gull will be present along all sections of the Marine Scheme during the breeding season.

350. However, herring gull is considered to be relative insensitive to such disturbance effects (Garthe and Hüppop 2004, Furness *et al.* 2013), and a conclusion of no LSE was reached in relation to disturbance and displacement for the BBWF HRA Stage One Screening Report (BBWFL, 2021).

351. On this basis it can be concluded that there is no potential for construction or decommissioning related vessel disturbance to have an adverse effect on the Coquet Island SPA herring gull population

CHANGES IN PREY AVAILABILITY

352. Herring gull have a highly opportunistic diet (del Hoyo *et al*., 1996), utilising terrestrial, intertidal and marine habitats to forage for a wide variety of prey species including invertebrates, small fish and carrion (including fishery discards). Indirect effects on herring gulls may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Coquet Island SPA herring gull population in the short-term.

353. During construction there is potential for prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (Volume 2 Chapter 9 Fish and Shellfish Ecology).

354. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

355. Given their wide-ranging foraging behaviour and plasticity in foraging habitat and diet (del Hoyo *et al*., 1996), together with any effects being intermittent, spatially-restricted and temporary in nature, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Coquet Island SPA herring gull population.

PROJECT ALONE EFFECTS: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE (INCLUDING NEARSHORE ACTIVITY)

356. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to inspection surveys and potential geophysical surveys (to check the Offshore Export Cables for any evidence of exposure or occurrence of freespans) and any cable repair or reburial works as outlined in Table 2-3 MDS specific to the assessment .

357. Herring gull is considered to be relative insensitive to disturbance away from the breeding colony (Garthe and Hüppop 2004, Furness *et al.* 2013), and a conclusion of no LSE was reached in relation to disturbance and displacement for the BBWF HRA Stage One Screening Report (BBWFL, 2021). On this basis it is considered that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Coquet Island SPA herring gull population.

CHANGES IN PREY AVAILABILITY

358. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect herring gull survival and productivity in the Coquet Island SPA herring gull population.

359. However, herring gull has flexible foraging habits and a highly opportunistic diet (del Hoyo *et al*., 1996), which enables them to forage for a wide variety of prey species including invertebrates, small fish and carrion (including fishery discards).

360. It is therefore considered that there is relatively little potential for the Coquet Island SPA herring gull population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Coquet Island SPA herring gull population.

IN-COMBINATION EFFECTS

361. As detailed above, any effects from the Marine Scheme alone on the Coquet Island SPA herring gull population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.6.10. Assessment for the Breeding Seabird Assemblage

362. The breeding seabird assemblage for the Coquet Island SPA is a qualifying feature on the basis of the SPA supporting 39,458 individual seabirds, including those species assessed above.

363. Potential impacts of the Marine Scheme alone and in-combination with other plans and projects on the breeding seabird assemblage for the SPA could arise via effects on the individual species within the assemblage feature. The assessments undertaken above identify no adverse effect in relation to any of the SPA populations which contribute to the assemblage feature (both for the Marine Scheme alone and in-combination).

364. Therefore, it is concluded that there is no potential for an adverse effect on the Coquet Island SPA breeding seabird assemblage feature.

2.6.11. Site Conclusion

365. It is concluded that there is no potential for an adverse effect on the qualifying features of the Coquet Island SPA due to the effects from the Marine Scheme alone or in-combination with other plans and projects. Consequently, it is concluded that there is no potential for an Adverse Effects on Integrity of the Coquet Island SPA.

2.7. Assessment of AEOSI: Farne Islands SPA

2.7.1. European Site Information and Conservation Objectives

366. The Farne Islands SPA are a group of low-lying islands located 2-8 km off the coast of Northumberland in northeast England, approximately 46 km south of the Marine Scheme in Scottish waters and 35km west of the Marine Scheme in English waters. The Farne Islands was first classified as an SPA in 1985, with the surrounding marine environment protected by the Northumberland Marine SPA, which was classified in 2017 to protect the foraging areas of breeding seabirds.

367. There are four Annex I qualifying features and the site qualifies under Article 4.2 by regularly supporting one migratory seabird species and in excess of 20,000 breeding seabirds, including four named component species as identified on the citation but with a further six identified by Natural England in their scoping advice for BBWF (Table 5.106, volume 3, appendix 6.2 of the BBWF Offshore EIA Report (BBWFL, 2022a)). Six of these species are considered to have no connectivity with the Marine Scheme based on their mean maximum foraging ranges (Woodward *et al*. 2019), or in the case of fulmar being insensitive to potential impacts from the development (e.g. Garthe and Hüppop 2004, Furness *et al*. 2013).

368. The conservation objectives of this SPA are:

- *To ensure that the integrity of the site is maintained or restored as appropriate; and*
- *To ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining*
    - *The extent and distribution of the habitats of the qualifying features;*
    - *The structure and function of the habitats of the qualifying features;*
    - *The supporting processes on which the habitats of the qualifying features rely;*
    - *The population of each of the qualifying features; and*
- *The distribution of the qualifying features within the site.*

Table 2-19: Details on the Qualifying Features of the Farne Islands SPA

Qualifying Feature	Season	Site Condition	Citation Population Size	Potential LSE
Guillemot	Breeding	Not available	65,751 individuals	Yes
Sandwich tern	Breeding	Not available	1,724 individuals	Yes
Roseate tern	Breeding	Not available	26 individuals	No
Common tern	Breeding	Not available	366 individuals	No
Arctic tern	Breeding	Not available	4,006 individuals	Yes
Seabird assemblage	Breeding	Not available	163,819 individuals	Yes
Puffin*	Breeding	Not available	76,798 individuals	Yes
Cormorant*	Breeding	Not available	230 individuals	No

Qualifying Feature	Season	Site Condition	Citation Population Size	Potential LSE
Shag*	Breeding	Not available	1,677 individuals	No
Kittiwake*	Breeding	Not available	8,241 individuals	Yes
Fulmar*	Breeding	Not available	Not available	No
Black-headed gull*	Breeding	Not available	Not available	No
Great black-backed gull*	Breeding	Not available	Not available	Yes
Lesser black-backed gull*	Breeding	Not available	Not available	Yes
Herring gull*	Breeding	Not available	Not available	Yes
Razorbill*	Breeding	Not available	Not available	Yes

*Named components of the assemblage only.

** Included on the basis of the Natural England scoping advice for BBWF (volume 3, appendix 6.2 of the BBWF Offshore EIA Report (BBWFL, 2022d)).

2.7.2. Assessment of Effects on Guillemot

369. The Farne Islands SPA guillemot population is currently estimated to number 85,816 individuals, based upon the most recently available count data from 2019 (BBWF Offshore EIA Report, volume 3, appendix 11.5 (BBWFL, 2022c). The SPA population has shown a strongly increasing population trend over the long-term, with numbers increasing (virtually) year on year from an estimated 24,958 individuals in 1986 (SMP 2022).

370. The Marine Scheme does not overlap with the Farne Islands SPA, so that potential impacts on its guillemot population will only occur as a result of individuals from the Farne Islands SPA colony occurring in the area (or vicinity) of the Marine Scheme.

371. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

372. The Farne Islands is 35 km from the Marine Scheme in English waters at the closest point and 46 km from the Marine Scheme in Scottish Waters at the closest point. Based on the mean maximum foraging range (plus 1 SD) for guillemot of 153.7 km, there is potential for breeding guillemot from the Farne Islands SPA to be present along the entire Marine Scheme in both English and Scottish Waters.

373. During the non-breeding period guillemot distribution is less constrained by the location of the breeding colonies but for the purposes of the current assessment, it is assumed that the area occupied by the SPA population is defined by the mean maximum breeding season foraging range plus 1 SD following Buckingham *et al.* (2022). Thus, the potential for effects of construction-related disturbance is assumed to be similar to that during the breeding season.

374. When using the marine environment (and not at the breeding colony), guillemots are considered to have a moderate sensitivity to such sources of direct disturbance (Table 2-6 Sensitivity of qualifying features of the SPAs included in this RIAA to vessel disturbance.. Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign guillemot as '3' on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al*. 2013).

375. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

376. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

377. Although guillemot has moderate sensitivity to disturbance effects, given the highly localised and temporary nature of the construction activities, the limited number of vessels that will be present on site at any one time and that vessels will move progressively along the entire Marine Scheme during the construction period, it is considered that there is no potential for construction or decommissioning related vessel disturbance or displacement to lead to an adverse effect on the Farne Islands SPA guillemot population..

CHANGES TO PREY AVAILABILITY

378. Sandeels are key prey for guillemots, with a range of other species taken including clupeids (sprat and juvenile herring; del Hoyo *et al*., 1996). Indirect effects on guillemots may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Farne Islands SPA guillemot population in the short-term.

379. During construction there is potential for prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section2.2.4, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (Volume 2 Chapter 9 Fish and Shellfish Ecology).

380. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left in situ with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

381. Given the highly localised and temporary nature of potential effects on prey species described above and in Section 2.2.4, together with the availability of alternative foraging habitat, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Farne Islands SPA guillemot population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

382. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the 35-year lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

383. Although guillemot is rated has having moderate sensitivity to vessel disturbance, disturbance from vessels undertaking annual inspection surveys and involved in cable reburial and repairs will be substantially reduced in both spatial and temporal extent compared to activities during construction and operation. It is therefore considered that that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Farne Islands guillemot population.

CHANGES TO PREY AVAILABILITY

384. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect survival and productivity in the Farne Islands SPA guillemot population for the reasons outlined in Section 2.2.6.

385. Where additional cable protection is required along the Marine Scheme, this will result in permanent subtidal habitat loss. However, as discussed in Section 2.2.6, given the limited presence of key foraging, nursey and spawning grounds for key prey species along all sections of the Marine Scheme (English and Scottish), there is no potential for any adverse effects on the Farne Islands SPA guillemot populations due to a reduction in prey availability.

386. Once the Marine Scheme is operational, there is potential for EMF and thermal emissions, although as discussed in Section 2.2.6 these effects are highly localised and are not predicted to have adverse effects on the availability of prey species.

387. There is also potential for underwater noise from geophysical surveys and temporary habitat loss and increased SSC during cable repairs and reburials. However, activities associated with cable repairs and reburials would be substantially less than during construction and decommissioning and are not predicted to adversely affect prey species.

388. Cable protection measures provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels, although overall any change in prey abundance and/or distribution through the presence of cable protection measures is likely to be very small relative to the area over which SPA guillemots forage.

389. It is therefore considered that there is relatively little potential for the Farne Islands SPA guillemot population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Farne Islands SPA guillemot population.

IN-COMBINATION EFFECTS

390. As detailed above, any effects from the Marine Scheme alone on the Farne Islands SPA guillemot population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.7.3. Assessment of Effects on Sandwich Tern

391. Based on evidence presented in the Farne Islands SPA Department Brief (Natural England, 2015d) at the time of classification (1985) the Farne Islands supported 4,000 pairs of Sandwich tern. However, at the next 5-year mean (2010 – 2014) count numbers had dropped to 862 breeding pairs. This represents 7.84% of the GB breeding population.

392. The Marine Scheme does not overlap with the Farne Islands SPA, so that potential impacts on its Sandwich tern population will only occur as a result of individuals from the Farne Islands SPA colony occurring in the area (or vicinity) of the Marine Scheme

393. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

394. The Farne Islands is 35 km from the Marine Scheme in English waters at the closest point and 46 km from the Marine Scheme in Scottish Waters at the closest point. Based on the mean maximum breeding foraging range (plus 1SD) for Sandwich tern of 57.5 km, there is potential for Sandwich tern from the Farne Islands SPA to be present along the entire Marine Scheme in both English and Scottish Waters.

395. When using the marine environment (and not at the breeding colony), Sandwich terns are considered to have a relatively low sensitivity to vessel disturbance. Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign Sandwich tern as ‘2’ on a five-scale ranking

system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al.* 2013).

396. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

397. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

398. Given that Sandwich tern is rated has having low sensitivity to disturbance from vessels and taking into account the highly localised and temporary nature of the construction activities, with vessels progressively moving along the entire Marine Scheme, there is no potential for construction or decommissioning related disturbance or displacement to lead to an adverse effect on the Farne Islands SPA Sandwich tern population.

CHANGES TO PREY AVAILABILITY

399. Sandwich tern are marine feeders, foraging mainly on sandeel, herring, sprat and whiting. Indirect effects on Sandwich tern may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Farne Islands SPA Sandwich tern population in the short-term.

400. As discussed in Section 2.2.5, during construction there is potential for prey of seabird species to be affected by temporary habitat loss/disturbance and increased SSC and deposition during seabed preparation, cable installation, trenchless technology works, and the installation of cable protection. Prey species may also be affected by underwater noise associated with pre-construction geophysical surveys in particular the use of SBP equipment. These effects, however, are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

401. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

402. There is potential for Sandwich tern associated with the Farne Islands SPA to be present along the southern end of the Marine Scheme and near the Landfall (in English Waters). However, given the highly localised and temporary nature of potential effects on prey species described above and in Section 2.2.5, together with the availability of alternative foraging habitat in the waters adjacent to the

Northumberland Marine SPA, there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Farne Islands SPA Sandwich tern population.

PROJECT ALONE EFFECTS: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

403. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the 35-year lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

404. Given that Sandwich tern is rated has having low sensitivity to vessel disturbance, and that maintenance activities would be limited to a small, discrete section of the Marine Scheme, there is no potential for an adverse effect on the on the Farne Islands SPA Sandwich tern population.

CHANGES IN PREY AVAILABILITY

405. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect survival and productivity in the Farne Islands SPA Sandwich tern population for the reasons outlined in Section 2.2.6.

406. Where additional cable protection is required along the Marine Scheme, this will result in permanent subtidal habitat loss. However, as discussed in Section 2.2.6, given the limited presence of key foraging, nursey and spawning grounds for key prey species along all sections of the Marine Scheme (English and Scottish), there is no potential for any adverse effects on the Farne Islands SPA Sandwich tern population due to a reduction in prey availability.

407. Once the Marine Scheme is operational, there is potential for EMF and thermal emissions, although as discussed in Section 2.2.6 these effects are highly localised and are not predicted to have adverse effects on the availability of prey species.

408. There is also potential for underwater noise from geophysical surveys and temporary habitat loss and increased SSC during cable repairs and reburials. However, activities associated with cable repairs and reburials would be substantially less than during construction and decommissioning and are not predicted to adversely affect prey species.

409. Cable protection measures provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels, although overall any change in prey abundance and/or distribution through the presence of cable protection measures is likely to be very small relative to the area over which SPA Sandwich terns forage.

410. It is therefore considered that there is relatively little potential for the Farne Islands SPA Sandwich tern population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Farne Islands SPA Sandwich tern population.

IN-COMBINATION EFFECTS

411. As detailed above, any effects from the Marine Scheme alone on the Farne Islands SPA Sandwich tern population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.7.4. Assessment of Effects on Arctic Tern

412. Based on evidence presented in the Farne Islands SPA Department Brief (Natural England, 2015d) at the time of classification (1985) the Farne Islands supported 4,000 pairs of Arctic tern. However, at the next 5-year mean (2010 – 2014) count numbers had dropped to 2,003 breeding pairs. This represents 3.78% of the GB breeding population.

413. The Marine Scheme does not overlap with the Farne Islands SPA, so that potential impacts on its Arctic tern population will only occur as a result of individuals from the Farne Islands SPA colony occurring in the area (or vicinity) of the Marine Scheme

414. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

415. The Farne Islands is 35 km from the Marine Scheme in English waters at the closest point and 46 km from the Marine Scheme in Scottish Waters at the closest point. Based on the mean maximum breeding foraging range (plus 1SD) for Arctic tern of 40.5 km, there is potential for Arctic tern from the Farne Islands SPA to be present along the entire Marine Scheme in English Waters.

416. When using the marine environment (and not at the breeding colony), Arctic tern are considered to have a relatively low sensitivity to vessel disturbance. Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign Arctic tern as '2' on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al.* 2013).

417. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take

18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

418. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

419. Given that Arctic tern is rated has having low sensitivity to disturbance from vessels and taking into account the highly localised and temporary nature of the construction activities, with vessels progressively moving along the entire Marine Scheme, there is no potential for construction or decommissioning related disturbance or displacement to lead to an adverse effect on the Farne Islands SPA Arctic tern population.

CHANGES TO PREY AVAILABILITY

420. Arctic tern are marine feeders, foraging mainly on sandeel, herring, sprat and whiting. Indirect effects on Arctic tern may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Farne Islands SPA Arctic tern population in the short-term.

421. As discussed in Section 2.2.5, during construction there is potential for prey of seabird species to be affected by temporary habitat loss/disturbance and increased SSC and deposition during seabed preparation, cable installation, trenchless technology works, and the installation of cable protection. Prey species may also be affected by underwater noise associated with pre-construction geophysical surveys in particular the use of SBP equipment. These effects, however, are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (Volume 2 Chapter 9 Fish and Shellfish Ecology).

422. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

423. There is potential for Arctic tern associated with the Farne Islands SPA to be present along the southern end of the Marine Scheme and near the Landfall (in English Waters). However, given the highly localised and temporary nature of potential effects on prey species described above and in Section 2.2.5, together with the availability of alternative foraging habitat in the waters adjacent to the Northumberland Marine SPA, there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Farne Islands SPA Arctic tern population.

PROJECT ALONE EFFECTS: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

424. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the 35-year lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

425. Given that Arctic tern is rated has having low sensitivity to vessel disturbance, and that maintenance activities would be limited to a small, discrete section of the Marine Scheme, there is no potential for an adverse effect on the on the Farne Islands SPA Arctic tern population

CHANGES IN PREY AVAILABILITY

426. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect survival and productivity in the Farne Islands SPA Arctic tern population for the reasons outlined in Section 2.2.6.

427. Where additional cable protection is required along the Marine Scheme, this will result in permanent subtidal habitat loss. However, as discussed in Section 2.2.6, given the limited presence of key foraging, nursey and spawning grounds for key prey species along all sections of the Marine Scheme (English and Scottish), there is no potential for any adverse effects on the Farne Islands SPA Arctic tern population due to a reduction in prey availability.

428. Once the Marine Scheme is operational, there is potential for EMF and thermal emissions, although as discussed in Section 2.2.6 these effects are highly localised and are not predicted to have adverse effects on the availability of prey species.

429. There is also potential for underwater noise from geophysical surveys and temporary habitat loss and increased SSC during cable repairs and reburials. However, activities associated with cable repairs and reburials would be substantially less than during construction and decommissioning and are not predicted to adversely affect prey species.

430. Cable protection measures provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels, although overall any change in prey abundance and/or distribution through the presence of cable protection measures is likely to be very small relative to the area over which SPA Arctic tern forage.

431. It is therefore considered that there is relatively little potential for the Farne Islands SPA Arctic tern population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently,

it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Farne Islands SPA Arctic tern population.

IN-COMBINATION EFFECTS

432. As detailed above, any effects from the Marine Scheme alone on the Farne Islands SPA Arctic tern population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.7.5. Assessment of Effects on Puffin

433. The Farne Islands SPA puffin population is currently estimated to number 87,504 individuals, based upon the most recently available count data from 2019 (BBWF Offshore EIA Report, volume 3, appendix 11.5 (BBWFL, 2022c)). This is above the citation level (Table 5.106) and represents a substantial increase from the earliest count available for the SPA on the SMP database, which estimated 52,658 individuals in 1989 (SMP 2022). Since 1989, the available count data indicate that numbers increased to a peak in the early 2000s (with 111,348 individuals in 2003) but have since varied from 73,670 (in 2008) to 87,912 (in 2018).

434. The Marine Scheme does not overlap with the Farne Islands SPA, so that potential impacts on its puffin population will only occur as a result of individuals from the Farne Islands SPA colony occurring in the area (or vicinity) of the Marine Scheme.

435. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

436. Based on the mean max (plus 1SD) foraging range for puffin 265.4 km (Table 2-5 Breeding season foraging ranges for relevant SPA qualifying seabird species (Woodward *et al.,* 2019)) it is likely that breeding puffin from the Farne Islands SPA will be present along the entire Marine Scheme in both English and Scottish Waters.

437. During the non-breeding periods, puffin migrate rapidly from their UK breeding areas dispersing widely across north-west European seas and the Atlantic (Wernham *et al*. 2002, Harris and Wanless 2011, Jessopp *et al* 2013), such that there is no potential for effects of construction-related disturbance.

438. When using the marine environment (and not at the breeding colony), puffins are considered to have a relatively low sensitivity to such sources of direct disturbance. Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign puffin as '2' on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight

distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al.* 2013).

439. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

440. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

441. Given the relatively low sensitivity of puffin to disturbance effects, the relatively small areas that will be subject to activities with the potential to result in disturbance at any given time during the construction period and the fact that these potential effects will be temporary, it is considered that there is no potential for construction or decommissioning related disturbance or displacement to lead to an adverse effect on the Farne Islands SPA puffin population.

CHANGES TO PREY AVAILABILITY

442. Sandeels are key prey for puffins, with a range of other species taken including clupeids and gadids (del Hoyo *et al*., 1996). Indirect effects on puffins may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Farne Islands SPA puffin population in the short-term.

443. During construction there is potential for prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

444. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

445. Given the highly localised and temporary nature of potential effects on prey species described above and in Section 2.2.5, together with the availability of alternative foraging habitat, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Farne Islands SPA puffin population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

446. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the 35-year lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

447. Given that puffin are considered to have low sensitivity to vessel disturbance, it is therefore considered that that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Farne Islands SPA puffin population.

CHANGES TO PREY AVAILABILITY

448. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect survival and productivity in the Farne Islands SPA puffin population for the reasons outlined in Section 2.2.6.

449. Where additional cable protection is required along the Marine Scheme, this will result in permanent subtidal habitat loss. However, as discussed in Section 2.2.6, given the limited presence of key foraging, nursey and spawning grounds for key prey species along all sections of the Marine Scheme (English and Scottish), there is no potential for any adverse effects on the Farne Islands SPA puffin population due to a reduction in prey availability.

450. Once the Marine Scheme is operational, there is potential for EMF and thermal emissions, although as discussed in Section 2.2.6 these effects are highly localised and are not predicted to have adverse effects on the availability of prey species.

451. There is also potential for underwater noise from geophysical surveys and temporary habitat loss and increased SSC during cable repairs and reburials. However, activities associated with cable repairs and reburials would be substantially less than during construction and decommissioning and are not predicted to adversely affect prey species.

452. Cable protection measures provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels, although overall any change in prey abundance and/or distribution through the presence of cable protection measures is likely to be very small relative to the area over which SPA puffins forage.

453. It is therefore considered that there is relatively little potential for the Farne Islands SPA puffin population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently,

it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Farne Islands SPA puffin population.

IN-COMBINATION EFFECTS

454. As detailed above, any effects from the Marine Scheme alone on the Farne Islands SPA puffin population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.7.6. Assessment of Effects on Kittiwake

455. The Farne Islands SPA kittiwake population is currently estimated to number 8,804 individuals, based upon the most recently available count data from 2019 (BBWFL Offshore EIA Report, volume 3, appendix 11.5 (BBWFL, 2022c)). The SPA population was estimated to number between approximately 12,000 – 12,500 birds during the early 1990s (SMP 2022) but has since declined, although the decline is not as marked as in many of the kittiwake SPA populations on the east coast of Scotland and numbers remain just above the citation level.

456. The Marine Scheme does not overlap with the Farne Islands SPA, so that potential impacts on its kittiwake population will only occur as a result of individuals from the Farne Islands SPA colony occurring in the area (or vicinity) of the Marine Scheme.

457. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

458. The Farne Islands are located 35 km west of the Marine Scheme in English Waters at the closest point and 46 km south of the Marine Scheme in Scottish Waters at the closest point. Given that kittiwake has a mean maximum (plus 1 SD) foraging range of 300.6 km (Table 2-5 Breeding season foraging ranges for relevant SPA qualifying seabird species (Woodward *et al.,* 2019)) it is highly likely that kittiwake will be present along all sections of the Marine Scheme during the breeding season. Therefore, there is potential for the kittiwake feature of the Farne Islands SPA to be affected by disturbance associated with construction activities and vessels.

459. Tracking data (and associated modelling of foraging distributions) for kittiwake appear to suggest that the Marine Scheme is beyond waters that are heavily used by birds from the Farne Islands SPA during the breeding season (Wakefield *et al.* 2017).

460. During the non-breeding periods, kittiwake distribution is not constrained by the location of the breeding colonies and birds from the SPA population are likely to occur across large expanses of oceanic and

maritime waters (Frederiksen *et al.* 2012, Furness 2015) and the potential for effects of construction-related disturbance during the non-breeding season is lower than during the breeding season.

461. When using the marine environment (and not at the breeding colony), kittiwakes are considered to have a relatively low sensitivity to such sources of direct disturbance. Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign kittiwake as '2' on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al.* 2013).

462. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

463. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

464. Given that kittiwake have low sensitivity to vessel disturbance together with the highly localised and temporary nature of the construction activities, the limited number of vessels that will be present on site at any one time and that vessels will move progressively along the entire Marine Scheme during the construction period, it is considered that there is no potential for construction or decommissioning related vessel disturbance to have an adverse effect on the Farne Islands SPA kittiwake population.

CHANGES IN PREY AVAILABILITY

465. Key prey species for kittiwakes include sandeel and sprat (del Hoyo *et al*., 1996). Indirect effects on kittiwakes may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Farne Islands SPA kittiwake population in the short-term.

466. During construction there is potential for prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

467. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

468. Given the highly localised and temporary nature of potential effects on prey species described above and in Section 2.2.5, together with the availability of alternative foraging habitat, it is considered that

there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Farne Islands SPA kittiwake population.

PROJECT ALONE EFFECTS: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

469. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the 35-year lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

470. Given the low sensitivity of kittiwake to disturbance effects at sea (Garthe and Hüppop 2004; Furness *et al*. 2013), the relatively small areas relative to the species' foraging range that will be subject intermittently to potentially disturbing activities (Woodward *et al*. 2019), and the fact that these potential effects will be reduced compared to the construction and decommissioning phases, it is considered that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Farne Islands kittiwake population.

CHANGES IN PREY AVAILABILITY

471. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect kittiwake survival and productivity in the Farne Islands SPA kittiwake population.

472. Where additional cable protection is required along the Marine Scheme, this will result in permanent subtidal habitat loss. However, as discussed in Section 2.2.6, given the limited presence of key foraging, nursey and spawning grounds for key prey species along all sections of the Marine Scheme (English and Scottish), there is no potential for any adverse effects on the Farne Islands SPA kittiwake populations due to a reduction in prey availability.

473. Once the Marine Scheme is operational, there is potential for EMF and thermal emissions, although as discussed in Section 2.2.6 these effects are highly localised and are not predicted to have adverse effects on the availability of prey species.

474. There is also potential for underwater noise from geophysical surveys and temporary habitat loss and increased SSC during cable repairs and reburials. However, activities associated with cable repairs and reburials would be substantially less than during construction and decommissioning and are not predicted to adversely affect prey species.

475. Cable protection measures provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels. Whilst there is mounting evidence of potential

benefits of artificial structures in the main environment (Birchenough and Degrae 2020), the statistical significance of such benefits and details about trophic interactions, particularly for seabirds, remain largely unknown (Peschko *et al*., 2020; BOWL 2021a, 2021b; Scott, 2022). Overall, any change in prey abundance and/or distribution through the presence of cable protection measures is likely to be very small relative to the area over which SPA kittiwakes forage.

476. It is therefore considered that there is relatively little potential for the Farne Islands SPA kittiwake population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Farne Islands kittiwake population.

IN-COMBINATION EFFECTS

477. As detailed above, any effects from the Marine Scheme alone on the Farne Islands SPA kittiwake population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.7.7. Assessment of Effects on Great Black-Backed Gull

478. The Farne Islands SPA assemblage population of breeding great black-backed gull was estimated at 27 breeding adults.

479. The Marine Scheme does not overlap with the Farne Islands SPA, so that potential impacts on its lesser black-backed gull population will only occur as a result of individuals from the Farne Islands SPA colony occurring in the area (or vicinity) of the Marine Scheme.

480. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

481. The Farne Islands are located 35 km west of the Marine Scheme in English Waters at the closest point and 46 km south of the Marine Scheme in Scottish Waters at the closest point. Given that the lesser black-backed gull has a mean max (plus 1DS) foraging range of 73 km (Table 2-5 Breeding season foraging ranges for relevant SPA qualifying seabird species (Woodward *et al.,* 2019)) it is likely that great black-backed gull will be present along all sections of the Marine Scheme during the breeding season.

482. However, great black-backed gull is considered to be relatively insensitive to such disturbance effects (Garthe and Hüppop 2004, Furness *et al.* 2013), and a conclusion of no LSE was reached in relation to disturbance and displacement for the BBWF HRA Stage One Screening Report (BBWFL, 2021).

483. On this basis it can be concluded that there is no potential for construction or decommissioning related vessel disturbance to have an adverse effect on the Farne Islands SPA great black-backed gull population

CHANGES IN PREY AVAILABILITY

484. Great black-backed gull have an opportunistic diet (del Hoyo *et al*., 1996), utilising intertidal and marine habitats to forage for a wide variety of prey species including invertebrates, small fish and carrion (including fishery discards). Indirect effects on great black-backed gull may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Farne Islands SPA great black-backed gull population in the short-term.

485. During construction there is potential for prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

486. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

487. Given their wide-ranging foraging behaviour and plasticity in foraging habitat and diet (del Hoyo *et al*., 1996), together with any effects being intermittent, spatially-restricted and temporary in nature, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Farne Islands SPA great black-backed gull population.

PROJECT ALONE EFFECTS: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

488. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to inspection surveys and potential geophysical surveys (to check the Offshore Export Cables for any evidence of exposure or occurrence of freespans) and any cable repair or reburial works as outlined in Table 2-3 MDS specific to the assessment .

489. Great black-backed gull is considered to be relative insensitive to disturbance away from the breeding colony (Garthe and Hüppop 2004, Furness *et al.* 2013), and a conclusion of no LSE was reached in relation to disturbance and displacement for the BBWF HRA Stage One Screening Report (BBWFL, 2021). On this basis it is considered that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Farne Islands SPA lesser black-backed gull population.

CHANGES IN PREY AVAILABILITY

490. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect great black-backed gull survival and productivity in the Farne Islands SPA lesser black-backed gull population.

491. However, great black-backed gull has flexible foraging habits and an opportunistic diet (del Hoyo *et al*., 1996), which enables them to forage for a wide variety of prey species including invertebrates, small fish and carrion (including fishery discards).

492. It is therefore considered that there is relatively little potential for the Farne Islands SPA great black-backed gull population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Farne Islands SPA great black-backed gull population.

IN-COMBINATION EFFECTS

493. As detailed above, any effects from the Marine Scheme alone on the Farne Islands SPA great black-backed gull population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.7.8. Assessment of Effects on Lesser Black-Backed Gull

494. The Farne Islands SPA lesser black-backed gull population is currently estimated to number 1,362 individuals, based upon the most recently available count data from 2019 (Offshore EIA Report, volume 3, appendix 11.5). The earliest counts of lesser black-backed gull that are available on the SMP database (SMP 2022) for the SPA give an estimate of 1,330 individuals in 2000, with subsequent counts showing that the numbers of breeding individuals in the SPA population have fluctuated between a low of 862 in 2005 and a peak of 1,598 in 2006.

495. The Marine Scheme does not overlap with the Farne Islands SPA, so that potential impacts on its lesser black-backed gull population will only occur as a result of individuals from the Farne Islands SPA colony occurring in the area (or vicinity) of the Marine Scheme.

496. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

497. The Farne Islands are located 35 km west of the Marine Scheme in English Waters at the closest point and 46 km south of the Marine Scheme in Scottish Waters at the closest point. Given that the lesser black-backed gull has a mean max (plus 1DS) foraging range of 236 km (Table 2-5 Breeding season foraging ranges for relevant SPA qualifying seabird species (Woodward *et al.,* 2019)) it is likely that lesser black-backed gull will be present along all sections of the Marine Scheme during the breeding season.

498. However, lesser black-backed gull is considered to be relative insensitive to such disturbance effects (Garthe and Hüppop 2004, Furness *et al.* 2013), and a conclusion of no LSE was reached in relation to disturbance and displacement for the BBWF HRA Stage One Screening Report (BBWFL, 2021).

499. On this basis it can be concluded that there is no potential for construction or decommissioning related vessel disturbance to have an adverse effect on the Farne Islands SPA lesser black-backed gull population

CHANGES IN PREY AVAILABILITY

500. Lesser black-backed gull have a highly opportunistic diet (del Hoyo *et al*., 1996), utilising terrestrial, intertidal and marine habitats to forage for a wide variety of prey species including invertebrates, small fish and carrion (including fishery discards). Indirect effects on lesser black-backed gulls may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Farne Islands SPA lesser black-backed gull population in the short-term.

501. During construction there is potential for prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

502. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

503. Given their wide-ranging foraging behaviour and plasticity in foraging habitat and diet (del Hoyo *et al*., 1996), together with any effects being intermittent, spatially-restricted and temporary in nature, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Farne Islands SPA lesser black-backed gull population.

PROJECT ALONE EFFECTS: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

504. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to inspection surveys and potential geophysical surveys (to check the Offshore Export Cables for any evidence of exposure or occurrence of freespans) and any cable repair or reburial works as outlined in Table 2-3 MDS specific to the assessment .

505. Lesser black-backed gull is considered to be relative insensitive to disturbance away from the breeding colony (Garthe and Hüppop 2004, Furness *et al.* 2013), and a conclusion of no LSE was reached in relation to disturbance and displacement for the BBWF HRA Stage One Screening Report (BBWFL, 2021). On this basis it is considered that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Farne Islands SPA lesser black-backed gull population.

CHANGES IN PREY AVAILABILITY

506. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect lesser black-backed gull survival and productivity in the Farne Islands SPA lesser black-backed gull population.

507. However, lesser black-backed gull has flexible foraging habits and a highly opportunistic diet (del Hoyo *et al*., 1996), which enables them to forage for a wide variety of prey species including invertebrates, small fish and carrion (including fishery discards).

508. It is therefore considered that there is relatively little potential for the Farne Islands SPA lesser black-backed gull population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Farne Islands SPA lesser black-backed gull population.

IN-COMBINATION EFFECTS

509. As detailed above, any effects from the Marine Scheme alone on the Farne Islands SPA lesser black-backed gull population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.7.9. Assessment of Effects on Herring Gull

510. The Farne Islands SPA herring gull population is currently estimated to number 1,496 individuals, based upon the most recently available count data from 2019 (BBWF Offshore EIA Report, volume 3,

appendix 11.5 (BBWFL, 2022c)). The earliest counts of herring gull that are available on the SMP database (SMP 2022) for the SPA give an estimate of 1,148 individuals in 2000, with subsequent counts showing that the numbers of breeding individuals in the SPA population have fluctuated between a low of 1,048 in 2002 and a peak of 2,090 in 2006.

511. The Marine Scheme does not overlap with the Farne Islands SPA, so that potential impacts on its herring gull population will only occur as a result of individuals from the Farne Islands SPA colony occurring in the area (or vicinity) of the Marine Scheme.

512. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

513. The Farne Islands are located 35 km west of the Marine Scheme in English Waters at the closest point and 46 km south of the Marine Scheme in Scottish Waters at the closest point. Given that the herring gull as a mean max (plus 1DS) foraging range of 236 km (Table 2-5 Breeding season foraging ranges for relevant SPA qualifying seabird species (Woodward *et al.,* 2019)) it is likely that herring gull will be present along all sections of the Marine Scheme during the breeding season.

514. However, herring gull is considered to be relative insensitive to such disturbance effects (Garthe and Hüppop 2004, Furness *et al.* 2013), and a conclusion of no LSE was reached in relation to disturbance and displacement for the BBWF HRA Stage One Screening Report (BBWFL, 2021).

515. On this basis it can be concluded that there is no potential for construction or decommissioning related vessel disturbance to have an adverse effect on the Farne Islands SPA herring gull population

CHANGES IN PREY AVAILABILITY

516. Herring gull have a highly opportunistic diet (del Hoyo *et al*., 1996), utilising terrestrial, intertidal and marine habitats to forage for a wide variety of prey species including invertebrates, small fish and carrion (including fishery discards). Indirect effects on herring gulls may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Farne Islands SPA herring gull population in the short-term.

517. During construction there is potential for prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

518. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to

be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

519. Given their wide-ranging foraging behaviour and plasticity in foraging habitat and diet (del Hoyo *et al*., 1996), together with any effects being intermittent, spatially-restricted and temporary in nature, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Farne Islands SPA herring gull population.

PROJECT ALONE EFFECTS: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

520. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to inspection surveys and potential geophysical surveys (to check the Offshore Export Cables for any evidence of exposure or occurrence of freespans) and any cable repair or reburial works as outlined in Table 2-3 MDS specific to the assessment .

521. Herring gull is considered to be relative insensitive to disturbance away from the breeding colony (Garthe and Hüppop 2004, Furness *et al.* 2013), and a conclusion of no LSE was reached in relation to disturbance and displacement for the BBWF HRA Stage One Screening Report (BBWFL, 2021). On this basis it is considered that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Farne Islands SPA herring gull population.

CHANGES IN PREY AVAILABILITY

522. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect herring gull survival and productivity in the Farne Islands SPA herring gull population.

523. However, herring gull has flexible foraging habits and a highly opportunistic diet (del Hoyo *et al*., 1996), which enables them to forage for a wide variety of prey species including invertebrates, small fish and carrion (including fishery discards).

524. It is therefore considered that there is relatively little potential for the Farne Islands SPA herring gull population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Farne Islands SPA herring gull population.

IN-COMBINATION EFFECTS

525. As detailed above, any effects from the Marine Scheme alone on the Farne Islands SPA herring gull population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other

effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.7.10. Assessment of Effects on Razorbill

526. The Farne Islands SPA razorbill population is currently estimated to number 572 individuals, based upon the most recently available count data from 2019 (Offshore EIA Report, volume 3, appendix 11.5). This small SPA population has increased over the long term, with the population estimated as only 62 AOSs in 1986 (which would be expected to equate to 124 individuals) (SMP 2022). Numbers appear to have been relatively stable since 2005, albeit with some marked between-year fluctuations (with the annual population size varying from 421 to 677 between 2005 and 2019[7]).

527. The Marine Scheme does not overlap with the Farne Islands SPA, so that potential impacts on its razorbill population will only occur as a result of individuals from the Farnes Islands SPA colony occurring in the area (or vicinity) of the Marine Scheme.

528. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

529. The Farne Islands is 35 km from the Marine Scheme in English waters at the closest point and 46 km from the Marine Scheme in Scottish Waters at the closest point. Based on the mean max foraging range (plus 1SD) for razorbill of 164.6 km, there is potential for breeding guillemot from the Farne Islands SPA to be present along the entire Marine Scheme in both English and Scottish Waters.

530. During the non-breeding period, razorbill distribution is not constrained by the location of the breeding colonies and birds from the SPA population are likely to occur across large parts of the North Sea (Furness 2015, Buckingham *et al.* 2022).

531. When using the marine environment (and not at the breeding colony), razorbills are considered to have a moderate sensitivity to such sources of direct disturbance. Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign razorbill as '3' on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al.* 2013).

532. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall

[7] This omits the data from 2014 – 2018, which are based on counts of AOS rather than of individuals and may not be directly comparable.

will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

533. The potential for disturbance or displacement effects during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

534. Although razorbill has moderate sensitivity to disturbance effects, given the highly localised and temporary nature of the construction activities, the limited number of vessels that will be present on site at any one time and that vessels will move progressively along the entire Marine Scheme during the construction period, it is considered that there is no potential for construction or decommissioning related vessel disturbance or displacement to lead to an adverse effect on the Farne Islands SPA razorbill population.

CHANGES TO PREY AVAILABILITY

535. Sandeels are key prey for razorbills, with a range of other species taken including sprat and juvenile herring (del Hoyo *et al*., 1996). Indirect effects on razorbill may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Farne Islands SPA razorbill population in the short-term.

536. During construction there is potential for prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

537. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

538. Given the highly localised and temporary nature of potential effects on prey species described above and in Section 2.2.5, together with the availability of alternative foraging habitat, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Farne Islands SPA razorbill population

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

539. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to

one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the 35-year lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

540. Although razorbill is rated has having moderate sensitivity to vessel disturbance, disturbance from vessels undertaking annual inspection surveys and involved in cable reburial and repairs will be substantially reduced in both spatial and temporal extent compared to activities during construction and operation. It is therefore considered that that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Farne Islands SPA razorbill population.

CHANGES TO PREY AVAILABILITY

541. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect survival and productivity in the Farne Islands SPA razorbill population for the reasons outlined in Section 2.2.6.

542. Where additional cable protection is required along the Marine Scheme, this will result in permanent subtidal habitat loss. However, as discussed in Section 2.2.6, given the limited presence of key foraging, nursey and spawning grounds for key prey species along all sections of the Marine Scheme (English and Scottish), there is no potential for any adverse effects on the Farne Islands SPA razorbill population due to a changes in prey availability.

543. Once the Marine Scheme is operational, there is potential for EMF and thermal emissions, although as discussed in Section 2.2.6 these effects are highly localised and are not predicted to have adverse effects on the availability of prey species.

544. There is also potential for underwater noise from geophysical surveys and temporary habitat loss and increased SSC during cable repairs and reburials. However, activities associated with cable repairs and reburials would be substantially less than during construction and decommissioning and are not predicted to adversely affect prey species.

545. Cable protection measures provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels, although overall any change in prey abundance and/or distribution through the presence of cable protection measures is likely to be very small relative to the area over which SPA razorbills forage.

546. It is therefore considered that there is relatively little potential for the Farne Islands SPA razorbill population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Farne Islands SPA razorbill population.

IN-COMBINATION EFFECTS

547. As detailed above, any effects from the Marine Scheme alone on the Farne Islands SPA razorbill population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.7.11. Assessment of Effects on the Breeding Seabird Assemblage

548. The breeding seabird assemblage for the Farne Islands SPA is a qualifying feature on the basis of the SPA supporting 19,549 individual seabirds, including those species assessed above.

549. Potential impacts of the Marine Scheme alone and in-combination with other plans and projects on the breeding seabird assemblage for the SPA could arise via effects on the individual species within the assemblage feature. The assessments undertaken above identify no adverse effect in relation to any of the SPA populations which contribute to the assemblage feature (both for the Marine Scheme alone and in-combination).

550. Therefore, it is concluded that there is no potential for an adverse effect on the Farne Islands SPA breeding seabird assemblage feature.

2.7.12. Site Conclusion

551. It is concluded that there is no potential for an adverse effect on the qualifying features of the Farne Islands SPA due to the effects from the Marine Scheme alone or in-combination with other plans and projects. Consequently, it is concluded that there is no potential for an Adverse Effects on Integrity of the Farne Islands SPA.

2.8. Assessment of AEOSI: St. Abb's Head to Fast Castle SPA

2.8.1. European Site Information and Conservation Objectives

553. The St Abb's Head to Fast Castle SPA is located on the Berwickshire coast in southeast Scotland, approximately 37 km southwest of the Marine Scheme in Scottish waters and 46 km west of the Marine Scheme in English Waters. This assessment is applicable to the Marine Scheme in both Scottish waters and English waters.

554. The SPA was designated in 1997 and comprises an area of sea cliffs and coastal strip along which there are multiple seabird colonies, with a seaward extension which extends approximately 1 km into the marine environment.

555. There are no Annex I qualifying features and the site qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds, with the breeding seabird assemblage feature including five named component species (Table 2-1 European sites designated for ornithological features being considered within the RIAA). For the BBWF HRA Stage One Screening Report (BBWFL, 2021) no LSE was identified for shag given that the mean-maximum + 1SD foraging range for this species is 23.7 km. Therefore for the purposes of the RIAA for the Marine Scheme (due to the overlap of the Marine Scheme and the BBWF array area), four of five component species will assessed with the effect pathways associated with LSE for each of these detailed in Table 2-2 Impact pathways screened into the RIAA for ornithology and set out in the assessment below.

556. The conservation objectives of this SPA (as determined from NatureScot's SiteLink (SiteLink (nature.scot)) are:

- *To avoid deterioration of the habitats of the qualifying species (listed below) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and*
- *To ensure for the qualifying species that the following are maintained in the long term:*
  - *Population of the species as a viable component of the site;*
  - *Distribution of the species within site;*
  - *Distribution and extent of habitats supporting the species;*
  - *Structure, function and supporting processes of habitats supporting the species; and*
  - *No significant disturbance of the species.*

Table 2-20: Details on the qualifying features of the St Abb's Head to Fast Castle SPA

Qualifying Feature	Season	Site Condition	Citation Population Size	Potential LSE
Seabird assemblage	Breeding	Unfavourable declining	79,560 individuals	Yes
Kittiwake*	Breeding	Unfavourable declining	21,170 pairs	Yes
Herring gull*	Breeding	Unfavourable declining	1,160 pairs	Yes
Guillemot*	Breeding	Favourable maintained	31,750 individuals	Yes
Razorbill*	Breeding	Favourable maintained	2,180 individuals	Yes
Shag*	Breeding	Unfavourable declining	560 pairs	No

*Named components of the assemblage only.

2.8.2. Assessment of Effects on Kittiwake

557. The St Abb's Head to Fast Castle SPA kittiwake population is currently estimated to number 5,452 breeding pairs and has been declining since the SPA was designated. The Marine Scheme does not overlap with the St. Abb's Head to Fast Castle SPA, so that potential impacts on its kittiwake population will only occur as a result of individuals from the colony occurring in the area (or vicinity) of the Marine Scheme.

558. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

559. St. Abb's Head to Fast Castle SPA is located 37 km southwest of the Marine Scheme in Scottish waters at the closest point and 46 km west of the Marine Scheme in English Waters at the closest point. Given that kittiwake has a mean maximum (plus 1 SD) breeding season foraging range of 300.6 km (Table 2-5 Breeding season foraging ranges for relevant SPA qualifying seabird species (Woodward *et al.,* 2019)) it is highly likely that kittiwake will be present along all sections of the Marine Scheme during the breeding season. Therefore, there is potential for the kittiwake feature of the St. Abb's Head to Fast Castle SPA to be affected by disturbance associated with vessels and associated construction activities.

560. Indeed, tracking data (and associated modelling of foraging distributions) for kittiwake show that the part of the Marine Scheme that overlaps the BBWF array area also overlaps with, or occurs close to, waters that are used by birds from the St Abb's Head to Fast Castle SPA during the breeding season (Cleasby *et al.* 2018, Bogdanova *et al.* 2022). However, the degree of overlap is limited and excludes those areas of heaviest usage.

561. During the non-breeding periods, kittiwake distribution is not constrained by the location of the breeding colonies and birds from the SPA population are likely to occur across large expanses of oceanic and maritime waters (Frederiksen *et al.* 2012, Furness 2015) and the potential for effects of construction-related disturbance is lower than during the breeding season.

562. When using the marine environment (and not at the breeding colony), kittiwakes are considered to have a relatively low sensitivity to such sources of direct disturbance. Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign kittiwake as '2' on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al.* 2013).

563. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

564. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

565. Tracking data indicates that kittiwake from the St. Abb's Head to Fast Castle SPA will be present along the section of the Marine Scheme located in Scottish Waters and potentially in English Waters. However, given that kittiwake have low sensitivity to vessel disturbance together with the highly localised and temporary nature of the construction activities, the limited number of vessels that will be present on site at any one time and that vessels will move progressively along the entire Marine Scheme during the construction period, it is considered that there is no potential for construction or decommissioning related vessel disturbance to have an adverse effect on the St. Abb's Head to Fast Castle SPA kittiwake population.

CHANGES IN PREY AVAILABIILITY

566. Key prey species for kittiwakes include sandeel and sprat (del Hoyo *et al.*, 1996). Indirect effects on kittiwakes may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the St. Abb's Head to Fast Castle SPA kittiwake population in the short-term.

567. During construction there is potential for prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology)

568. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

569. Given the highly localised and temporary nature of potential effects on prey species described above and in Section 2.2.5, together with the availability of alternative foraging habitat, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the St. Abb's Head to Fast Castle SPA kittiwake population.

PROJECT ALONE EFFECTS: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

570. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the 35-year lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

571. Given the low sensitivity of kittiwake to disturbance effects at sea (Garthe and Hüppop 2004; Furness *et al*. 2013), the relatively small areas relative to the species' foraging range that will be subject intermittently to potentially disturbing activities (Woodward *et al*. 2019), and the fact that these potential effects will be reduced compared to the construction and decommissioning phases, it is considered that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the St. Abb's Head to Fast Castle kittiwake population.

CHANGES IN PREY AVAILABILITY

572. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect kittiwake survival and productivity in the St. Abb's Head to Fast Castle SPA kittiwake population.

573. Where additional cable protection is required along the Marine Scheme, this will result in permanent subtidal habitat loss. However, as discussed in Section 2.2.6, given the limited presence of key foraging, nursey and spawning grounds for key prey species along all sections of the Marine Scheme (English and Scottish), there is no potential for any adverse effects on the St. Abb's Head to Fast Castle SPA kittiwake populations due to a reduction in prey availability.

574. Once the Marine Scheme is operational, there is potential for EMF and thermal emissions, although as discussed in Section 2.2.6 these effects are highly localised and are not predicted to have adverse effects on the availability of prey species.

575. There is also potential for underwater noise from geophysical surveys and temporary habitat loss and increased SSC during cable repairs and reburials. However, activities associated with cable repairs and reburials would be substantially less than during construction and decommissioning and are not predicted to adversely affect prey species.

576. Cable protection measures provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels. Whilst there is mounting evidence of potential benefits of artificial structures in the main environment (Birchenough and Degrae 2020), the statistical significance of such benefits and details about trophic interactions, particularly for seabirds, remain largely unknown (Peschko *et al*., 2020; BOWL 2021a, 2021b; Scott, 2022). Overall, any change in prey abundance and/or distribution through the presence of cable protection measures is likely to be very small relative to the area over which SPA kittiwakes forage.

577. It is therefore considered that there is relatively little potential for the St Abb's Head to Fast Castle SPA kittiwake population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the St. Abb's to Fast Castle SPA kittiwake population.

IN-COMBINATION EFFECTS

578. As detailed above, any effects from the Marine Scheme alone on the St. Abb's to Fast Castle SPA kittiwake population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.8.3. Assessment of Effects on Herring Gull

579. The St Abb's Head to Fast Castle SPA herring gull population is currently estimated to number 306 breeding pairs, which is considerably lower than the citation population of 1,160 pairs. The Marine Scheme does not overlap with the St. Abb's Head to Fast Castle SPA, so that potential impacts on its herring gull population will only occur as a result of individuals from the colony occurring in the area (or vicinity) of the Marine Scheme.

580. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

581. St Abbs Head to Fast Castle SPA is located 37 km southwest of the Marine Scheme in Scottish waters at the closest point and 46 km west of the Marine Scheme in English Waters at the closest point. Given that herring gull has a mean maximum (plus 1 SD) foraging range of 85.6 km (Table 2-5 Breeding

season foraging ranges for relevant SPA qualifying seabird species (Woodward *et al.,* 2019)) it is likely that herring gull will be present along all sections of the Marine Scheme during the breeding season.

582. However, herring gull is considered to be relative insensitive to such disturbance effects (Garthe and Hüppop 2004, Furness *et al.* 2013), and a conclusion of no LSE was reached in relation to disturbance and displacement for the BBWF HRA Stage One Screening Report (BBWFL, 2021).

583. On this basis it can be concluded that there is no potential for construction or decommissioning related vessel disturbance to have an adverse effect on the St. Abb's Head to Fast Castle SPA herring gull population.

CHANGES IN PREY AVAILABILITY

584. Herring gulls have a highly opportunistic diet (del Hoyo *et al*., 1996), utilising terrestrial, intertidal and marine habitats to forage for a wide variety of prey species including invertebrates, small fish and carrion (including fishery discards). Indirect effects on herring gulls may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the St. Abb's Head to Fast Castle SPA herring gull population in the short-term.

585. During construction there is potential for prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

586. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

587. Given their wide-ranging foraging behaviour and plasticity in foraging habitat and diet (del Hoyo *et al*., 1996), together with any effects being intermittent, spatially-restricted and temporary in nature, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the St Abbs Head to Fast Castle SPA herring gull population.

PROJECT ALONE EFFECTS: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

588. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to inspection surveys and potential geophysical surveys (to check the Offshore Export Cables for any evidence of exposure or occurrence of freespans) and any cable repair or reburial works as outlined in Table 2-3 MDS specific to the assessment .

589. Herring gull is considered to be relative insensitive to disturbance away from the breeding colony (Garthe and Hüppop 2004, Furness *et al.* 2013), and a conclusion of no LSE was reached in relation

to disturbance and displacement for the BBWF HRA Stage One Screening Report (BBWFL, 2021). On this basis it is considered that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the St. Abb's Head to Fast Castle herring gull population.

CHANGES IN PREY AVAILABILITY

590. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect herring gull survival and productivity in the St. Abb's Head to Fast Castle SPA herring gull population.

591. However, herring gull has flexible foraging habits and a highly opportunistic diet (del Hoyo *et al*., 1996), which enables them to forage for a wide variety of prey species including invertebrates, small fish and carrion (including fishery discards).

592. It is therefore considered that there is relatively little potential for the St Abb's Head to Fast Castle SPA herring gull population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the St. Abb's to Fast Castle SPA herring gull population.

IN-COMBINATION EFFECTS

593. As detailed above, any effects from the Marine Scheme alone on the St. Abb's to Fast Castle SPA herring gull population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.8.4. Assessment of Effects on Guillemot

594. The St Abb's Head to Fast Castle SPA guillemot population has shown an overall increase during the last 30 years or so, and relative stability since the late 1990s, based on count data from the St Abb's Head National Nature Reserve (which holds the vast majority of the SPA population). The population size has remained above the citation population size (31,750 individuals) since designation.

595. The Marine Scheme does not overlap with the St. Abb's Head to Fast Castle SPA, so that potential impacts on its guillemot population will only occur as a result of individuals from the colony occurring in the area (or vicinity) of the Marine Scheme.

596. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

597. St Abbs Head to Fast Castle SPA is located 37 km southwest of the Marine Scheme in Scottish waters at the closest point and 46 km west of the Marine Scheme in English Waters at the closest point. Based on the mean maximum foraging range (plus 1 SD) for guillemot of 153.7 km (Woodward *et al*. 2019), there is potential for guillemot from the St. Abb's Head to Fast Castle SPA to be present along the entire Marine Scheme in both English and Scottish Waters.

598. Modelling of guillemot foraging distributions, as derived from tracking data from the chick-rearing period, indicates that the Marine Scheme has minimal overlap with waters that are predicted to be used by birds from the St. Abb's Head to Fast Castle SPA and exclude those areas of predicted greatest usage (Cleasby *et al.* 2018; Bogdanova *et al*. 2022).

599. During the non-breeding period guillemot distribution is less constrained by the location of the breeding colonies but for the purposes of the current assessment, it is assumed that the area occupied by the SPA population is defined by the mean maximum breeding season foraging range plus 1 SD following Buckingham *et al.* (2022) and BBWFL (2022c). Thus, the potential for effects of construction-related disturbance is assumed to be similar to that during the breeding season.

600. When using the marine environment (and not at the breeding colony), guillemots are considered to have a moderate sensitivity to such sources of direct disturbance (Table 2-6 Sensitivity of qualifying features of the SPAs included in this RIAA to vessel disturbance.). Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign guillemot as '3' on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al*. 2013).

601. As set out in the MDS (Table 2-3 MDS specific to the assessment) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

602. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

603. Although guillemot has moderate sensitivity to disturbance effects, given the highly localised and temporary nature of the construction activities, the limited number of vessels that will be present on site at any one time and that vessels will move progressively along the entire Marine Scheme during the construction period, it is considered that there is no potential for construction or decommissioning related vessel disturbance or displacement to lead to an adverse effect on the St Abbs Head to Fast Castle SPA guillemot population.

CHANGES TO PREY AVAILABILITY

604. Sandeels are key prey for guillemots, with a range of other species taken including clupeids (sprat and juvenile herring; del Hoyo *et al*., 1996). Indirect effects on guillemots may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the St. Abb's Head to Fast Castle SPA guillemot population in the short-term.

605. During construction there is potential for prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

606. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

607. Given the highly localised and temporary nature of potential effects on prey species described above and in Section 2.2.5, together with the availability of alternative foraging habitat, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the St. Abb's Head to Fast Castle SPA guillemot population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

608. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the 35-year lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

609. Although guillemot is rated has having moderate sensitivity to vessel disturbance, disturbance from vessels undertaking annual inspection surveys and involved in cable reburial and repairs will be substantially reduced in both spatial and temporal extent compared to activities during construction and operation. It is therefore considered that that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the St. Abb's Head to Fast Castle guillemot population.

CHANGES TO PREY AVAILABILITY

610. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect survival and productivity in the St. Abb's Head to Fast Castle SPA guillemot population for the reasons outlined in Section 2.2.6.

611. Where additional cable protection is required along the Marine Scheme, this will result in permanent subtidal habitat loss. However, as discussed in Section 2.2.6, given the limited presence of key foraging, nursey and spawning grounds for key prey species along all sections of the Marine Scheme (English and Scottish), there is no potential for any adverse effects on the St. Abb's Head to Fast Castle SPA guillemot populations due to a reduction in prey availability.

612. Once the Marine Scheme is operational, there is potential for EMF and thermal emissions, although as discussed in Section 2.2.6 these effects are highly localised and are not predicted to have adverse effects on the availability of prey species.

613. There is also potential for underwater noise from geophysical surveys and temporary habitat loss and increased SSC during cable repairs and reburials. However, activities associated with cable repairs and reburials would be substantially less than during construction and decommissioning and are not predicted to adversely affect prey species.

614. Cable protection measures provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels, although overall any change in prey abundance and/or distribution through the presence of cable protection measures is likely to be very small relative to the area over which SPA guillemots forage.

615. It is therefore considered that there is relatively little potential for the St Abb's Head to Fast Castle SPA guillemot population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the St. Abb's to Fast Castle SPA guillemot population.

IN-COMBINATION EFFECTS

616. As detailed above, any effects from the Marine Scheme alone on the St. Abb's to Fast Castle SPA guillemot population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.8.5. Assessment of Effects on Razorbill

617. The St Abb's Head to Fast Castle SPA razorbill population has shown an overall increase during the last 30 years or so, and relative stability since the late 1990s, based on count data from the St Abb's

Head NNR (which holds the vast majority of the SPA population). The population size has remained above the citation population size (2,180 individuals) since designation.

618. The Marine Scheme does not overlap with the St. Abb's Head to Fast Castle SPA, so that potential impacts on its razorbill population will only occur as a result of individuals from the colony occurring in the area (or vicinity) of the Marine Scheme.

619. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE EFFECTS: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

620. St Abbs Head to Fast Castle SPA is located 37 km southwest of the Marine Scheme in Scottish waters at the closest point and 46 km west of the Marine Scheme in English Waters at the closest point. Based on the mean maximum breeding foraging range (plus 1 SD) for razorbill of 164.6 km (Woodward *et al*. 2019), there is potential for breeding razorbill from the St. Abb's Head to Fast Castle SPA to be present along the entire Marine Scheme in both English and Scottish Waters.

621. Modelling of razorbill foraging distributions, as derived from tracking data from the chick-rearing period, indicates that the Marine Scheme has minimal overlap with waters that are predicted to be used by birds breeding at the St Abb's Head to Fast Castle SPA (Cleasby *et al.* 2018).

622. During the non-breeding period, razorbill distribution is not constrained by the location of the breeding colonies and birds from the SPA population are likely to occur across large parts of the North Sea (Furness 2015, Buckingham *et al.* 2022).

623. When using the marine environment (and not at the breeding colony), razorbills are considered to have a moderate sensitivity to such sources of direct disturbance. Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign razorbill as '3' on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al.* 2013).

624. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

625. The potential for disturbance or displacement effects during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

626. Although razorbill has moderate sensitivity to disturbance effects, given the highly localised and temporary nature of the construction activities, the limited number of vessels that will be present on

site at any one time and that vessels will move progressively along the entire Marine Scheme during the construction period, it is considered that there is no potential for construction or decommissioning related vessel disturbance or displacement to lead to an adverse effect on the St Abbs Head to Fast Castle SPA razorbill population.

CHANGES TO PREY AVAILABILITY

627. Sandeels are key prey for razorbills, with a range of other species taken including sprat and juvenile herring (del Hoyo *et al*., 1996). Indirect effects on razorbill may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the St. Abb's Head to Fast Castle SPA razorbill population in the short-term.

628. During construction there is potential for prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

629. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

630. Given the highly localised and temporary nature of potential effects on prey species described above and in Section 2.2.5, together with the availability of alternative foraging habitat, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the St. Abb's Head to Fast Castle SPA razorbill population

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

631. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the 35-year lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

632. Although razorbill is rated has having moderate sensitivity to vessel disturbance, disturbance from vessels undertaking annual inspection surveys and involved in cable reburial and repairs will be substantially reduced in both spatial and temporal extent compared to activities during construction

and operation. It is therefore considered that that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the St. Abb's Head to Fast Castle razorbill population.

CHANGES TO PREY AVAILABILITY

633. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect survival and productivity in the St. Abb's Head to Fast Castle SPA razorbill population for the reasons outlined in Section 2.2.6.

634. Where additional cable protection is required along the Marine Scheme, this will result in permanent subtidal habitat loss. However, as discussed in Section 2.2.6, given the limited presence of key foraging, nursey and spawning grounds for key prey species along all sections of the Marine Scheme (English and Scottish), there is no potential for any adverse effects on the St. Abb's Head to Fast Castle SPA razorbill population due to a changes in prey availability.

635. Once the Marine Scheme is operational, there is potential for EMF and thermal emissions, although as discussed in Section 2.2.6 these effects are highly localised and are not predicted to have adverse effects on the availability of prey species.

636. There is also potential for underwater noise from geophysical surveys and temporary habitat loss and increased SSC during cable repairs and reburials. However, activities associated with cable repairs and reburials would be substantially less than during construction and decommissioning and are not predicted to adversely affect prey species.

637. Cable protection measures provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels, although overall any change in prey abundance and/or distribution through the presence of cable protection measures is likely to be very small relative to the area over which SPA razorbills forage.

638. It is therefore considered that there is relatively little potential for the St Abb's Head to Fast Castle SPA razorbill population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the St. Abb's to Fast Castle SPA razorbill population.

IN-COMBINATION EFFECTS

639. As detailed above, any effects from the Marine Scheme alone on the St. Abb's to Fast Castle SPA razorbill population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.8.6. Assessment of Effects on the Breeding Seabird Assemblage

640. The breeding seabird assemblage for the St Abb's Head to Fast Castle SPA is a qualifying feature on the basis of the SPA supporting 79,560 individual seabirds, including guillemot, razorbill, shag, kittiwake and herring gull.

641. Potential impacts of the Marine Scheme alone and in-combination with other plans and projects on the breeding seabird assemblage for the SPA could arise via effects on the individual species within the assemblage feature. The assessments undertaken above identify no adverse effect in relation to any of the SPA populations which contribute to the assemblage feature (both for the Marine Scheme alone and in-combination).

642. Therefore, it is concluded that there is no potential for an adverse effect on the St Abb's Head to Fast Castle SPA breeding seabird assemblage feature.

2.8.7. Site Conclusion

643. It is concluded that there is no potential for an adverse effect on the qualifying features of the St Abb's Head to Fast Castle SPA due to the effects from the Marine Scheme alone or in-combination with other plans and projects. Consequently, it is concluded that there is no potential for an Adverse Effects on Integrity of the St Abb's Head to Fast Castle SPA.

2.9. Assessment of AEOSI: Outer Firth of Forth and St Andrews Bay Complex SPA

2.9.1. European Site Information and Conservation Objectives

644. The Outer Firth of Forth and St Andrews Bay Complex SPA is 2 km west from the Marine Scheme in Scottish waters and 22 km west from the Marine Scheme in English Waters. This assessment is applicable to the Marine Scheme in both Scottish waters and English waters.

645. The Outer Firth of Forth and St Andrews Bay Complex SPA provides supporting habitat for a range of breeding and non-breeding seabird and waterbird species. The SPA stretches from Arbroath to St. Abb's Head encompassing the Firth of Forth, the outer Firth of Tay and St. Andrews Bay and comprises an area of 2,720.68 km^2. The site extends beyond the 12 nautical miles (nm) boundary of territorial and offshore waters to encompass key seabird feeding areas.

646. The Outer Firth of Forth and St Andrews Bay Complex SPA attracts one of the largest and most diverse concentrations of marine birds in Scotland. During the non-breeding season, it provides important wintering grounds used for feeding, moulting and roosting by a variety of waterbirds including the largest aggregations of red-throated diver and common eider in Scotland. The Firth of Forth is also notable for its concentrations of wintering gulls, including little gull, kittiwake, black-headed gull, common gull and herring gull. Together with guillemot, shag and razorbill these species contribute to an assemblage of over 40,000 seabirds using the site during the non-breeding season.

647. The site also encompasses feeding grounds for breeding common tern, Arctic tern and shag nesting colonies. During the breeding season, kittiwake, gannet, herring gull, guillemot, puffin, and Manx shearwater also contribute to the SPA assemblage of over 100,000 seabirds.

648. There are 21 Annex I qualifying features and the site qualifies under Article 4.2 by regularly supporting breeding seabirds, non-breeding seabirds and waterbird assemblages (Table 2-1). The potential for LSE has been identified in relation to all 21 species (Table 2-1), with the effect pathways associated with LSE for each of these detailed in Table 2.21and set out in the assessment below.

649. The conservation objectives of this SPA (as determined from NatureScot's SiteLink (NatureScot 2022) are:

    1. *To ensure that the qualifying features of the Outer Firth of Forth and St Andrews Bay Complex SPA are in favourable condition and make an appropriate contribution to achieving Favourable Conservation Status.*
    2. *To ensure that the integrity of the Outer Firth of Forth and St Andrews Bay Complex SPA is restored in the context of environmental changes by meeting objectives 2a, 2b and 2c for each qualifying feature:*

        2a The populations of the qualifying features are viable components of the Outer Firth of Forth and St Andrews Bay Complex SPA.

        2b. The distribution of the qualifying features is maintained throughout the site by avoiding significant disturbance of the species.

        2c. The supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at the Outer Firth of Forth and St Andrews Bay Complex SPA.

650. On the basis that shag, kittiwake, common tern and herring gull are considered to be in unfavourable condition the overarching objective for this site is a restore objective (NatureScot and JNCC 2021).

651. The citation population size and site condition status for each qualifying feature are detailed in Table 2.8 along with whether the potential for LSE has been determined for the qualifying feature.

Table 2-21: Details on the qualifying features of the Outer Firth of Forth and St Andrews Complex SPA

Qualifying Feature	Season	Site Condition	Citation Population Size	Potential LSE
Eider	Non-breeding	Favourable	22,000 individuals	Yes
Velvet scoter*	Non-breeding	Favourable	780 individuals	Yes
Common scoter*	Non-breeding	Favourable	4,700 individuals	Yes
Long-tailed duck*	Non-breeding	Favourable	1,950 individuals	Yes
Common goldeneye*	Non-breeding	Favourable	590 individuals	Yes
Red-breasted merganser*	Non-breeding	Favourable	430 individuals	Yes
Red-throated diver	Non-breeding	Favourable	850 individuals	Yes
Slavonian grebe	Non-breeding	Favourable	30 individuals	Yes
Kittiwake*	Breeding and non-breeding	Unfavourable (breeding season) Favourable (non-breeding season	Breeding: as per: Forth Islands SPA, St Abb's Head to Fast Castle SPA, Non-breeding: No site reference population	Yes
Black-headed gull*	Winter	Favourable	Non-breeding: No site reference population	Yes
Little gull	Winter	Favourable	Non-breeding: No site reference population	Yes
Common gull*	Winter	Favourable	Non-breeding: No site reference population	Yes
Herring gull*	Breeding Winter	Unfavourable Favourable	Breeding: as per: Forth Islands SPA, St Abb's Head to Fast Castle SPA. Non-breeding: No site reference population	Yes
Common tern	Breeding	Unfavourable	Breeding: as per Forth Islands SPA	Yes
Arctic tern	Breeding	Favourable	Breeding: as per the Forth Islands SPA	Yes
Guillemot*	Breeding and non-breeding	Favourable (breeding and non-breeding)	Breeding as per: Forth Islands SPA, St Abb's Head to Fast Castle SPA	Yes

Qualifying Feature	Season	Site Condition	Citation Population Size	Potential LSE
			Non-breeding: No site reference population	
Razorbill***	Non-breeding	Favourable	Non-breeding: No site reference population	Yes
Puffin*	Breeding	Favourable	Breeding: as per Forth Islands SPA	Yes
Manx shearwater*	Breeding	Favourable	No site reference population	Yes
Gannet	Breeding	Favourable	As per Forth Islands SPA	Yes
Shag**	Breeding and non-breeding	Unfavourable (breeding season) Favourable (non-breeding season	Breeding as per Forth Islands SPA. Non-breeding: No site reference population	Yes
Breeding seabird assemblage	Breeding	Unfavourable	Puffin, kittiwake, Manx shearwater, guillemot, herring gull	Yes
Non-breeding seabird assemblage	Non-breeding	Favourable	Black-headed gull, common gull, herring gull guillemot, razorbill, shag, kittiwake	Yes
Waterfowl assemblage	Non-breeding	Favourable	Long-tailed duck, common scoter, velvet scoter, red-breasted merganser	Yes

*Named components of the waterfowl assemblage only.

**Named components of the breeding seabird assemblage only.

****Named components of the Non-breeding seabird assemblage only.

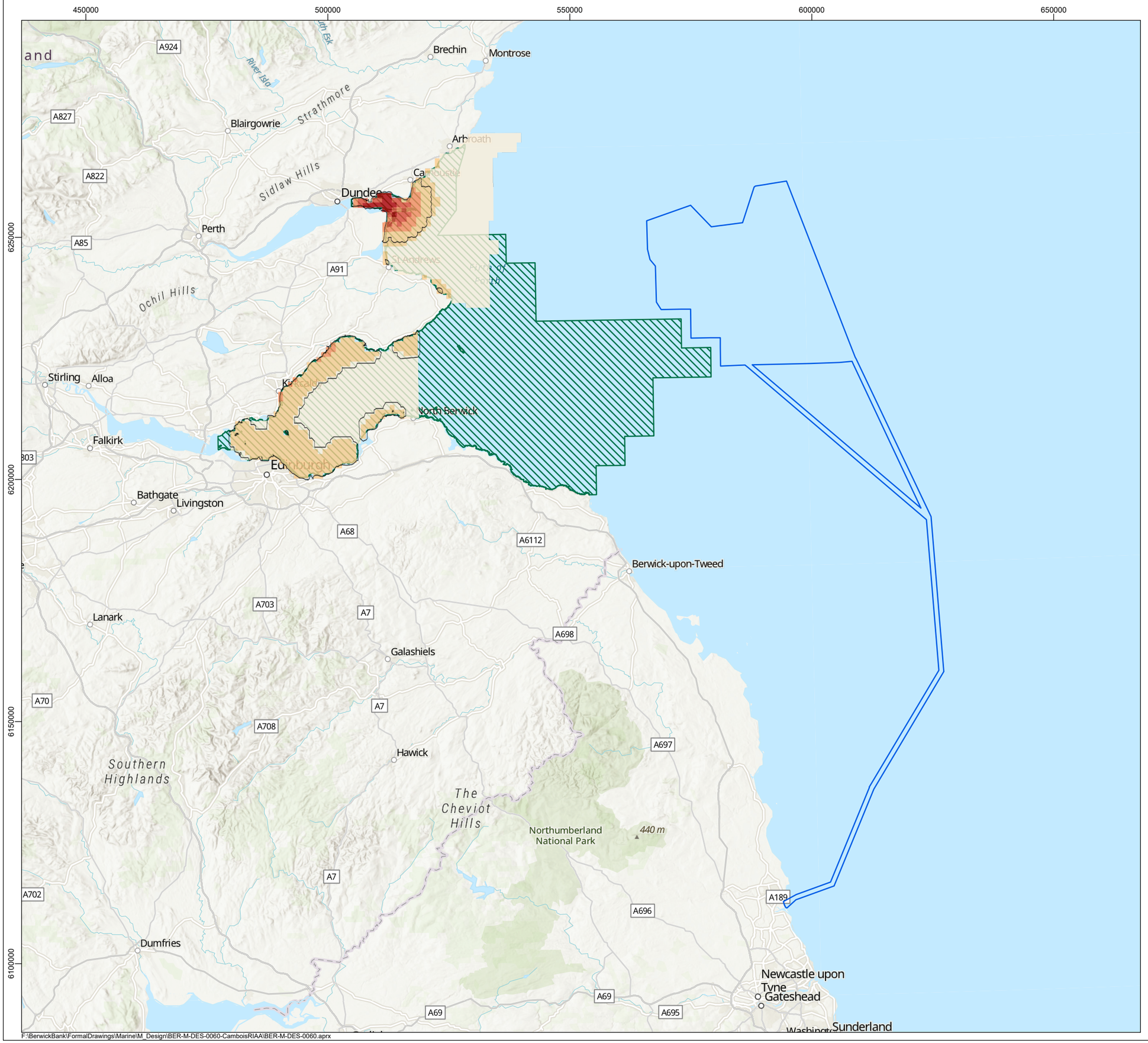
2.9.2. Assessment of Effects on Eider

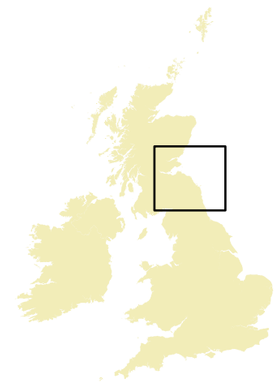
652. Within the Outer Firth of Forth and St Andrews Bay Complex SPA, eiders are present throughout the year. Their non-breeding season is from September to mid-April, with their flightless moult period being between July and mid-September. In the non-breeding season, the highest densities of eider within the SPA have been recorded in the Firth of Tay and within the central and northern Firth of Forth (SNH and JNCC 2016, NatureScot and JNCC 2022).

653. The site reference population of 22,000 individuals (5 year mean 2001/02-2004/05) has been calculated on multi-year programme of aerial, boat-based and land-based surveys (Lawson *et al*. 2015). Based on Wetland Bird Survey (WeBS) data the peak mean population size has fluctuated annually but has remained relatively stable (SSER 2022b). This is reflected in the favourable condition of eider within the Outer Firth of Forth and St. Andrew's Bay Complex SPA

654. Site specific advice relating to eider is to:

- *Maintain the population of non-breeding eider at a stable or increasing trend relative to the site reference population.*
- *Ensure eider continue to have access to, and can utilise all optimal habitats suitable for all relevant aspects of their life cycle associated with the site.*
- *Avoid significant disturbance to eider and ensure individuals can move safely between these areas within the site.*
- *Maintain the extent and distribution of the supporting habitats for eider within the site.*
- *Maintain the variety and abundance of food resources and the condition of supporting habitats and associated processes.*
- *Existing water quality should be maintained and any increase in nutrients, turbidity or contaminants where this could reduce supporting habitats and/or prey, should be avoided*.





Legend

- Marine Scheme Boundary
- Outer Firth of Forth and St. Andrew's Bay Complex SPA
- Common eider maximum curvature (10478)

Distribution of Comon eider (St Andrews Bay) (10478)
- 10 or less
- 10 - 50
- 50 - 100
- 100 - 200
- 200 or greater

Distribution of Common eider (Outer Firth of Forth) (10478)
- 10 or less
- 10 - 50
- 50 - 100
- 100 - 200
- 200 or greater

Rev	Date	Status	Drwn	Chkd	Appd
04	-	-	-	-	-
03	-	-	-	-	-
02	-	-	-	-	-
01	30/06/2023	ISSUED FOR REVIEW	RB	KC	KC

sse Renewables

Berwick Bank Wind Farm

Project

BERWICK BANK WIND FARM

Title

FIGURE 1
DISTRIBUTION OF COMMON EIDER

0 5 10 20 nm
0 10 20 40 km

N

Scale	Plot Size	Datum	Projection
1:750,000	A3	WGS84	UTM30N

Drawing Number	Sheet No.
BER-M-DES-0060-01	001 OF 001

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PROJECT ALONE: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

655. The Outer Firth of Forth and St Andrews Bay Complex SPA is located 2 km west of the Marine Scheme in Scottish waters at the closest point and 22 km west from the Marine Scheme in English Waters.

656. Eider are considered to have a moderate to high sensitivity to vessel disturbance (Goodship and Furness 2022). However, the main aggregation of eider are present off the Firth of Tay, it is unlikely that significant numbers of eiders use the Marine Scheme for foraging and/or moulting since the Marine Scheme lies entirely outwith the SPA (Lawson *et al*. 2015, SNH 2015, SNH and JNCC 2016; Figure 1).

657. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

658. It is possible that a number of ports in the region may be utilised during construction and that vessels transiting to and from the Marine Scheme may pass through the Outer Firth of Forth and St. Andrew's Bay Complex SPA. However, given that the maximum number of vessels used during construction at any one time would be 20, and that not all vessels will be transiting at the same time, it is considered that vessel movements associated with the Marine Scheme are unlikely to be noticeable above baseline vessel activity in the region.

659. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

660. As outlined in Table 2-4, all vessels will adhere to the Scottish Marine Wildlife Watching Code and the Marine and Coastal Wildlife Code to further reduce any potential for vessel disturbance. Given the distance between the Marine Scheme and the main known aggregation of eider within the SPA, together with the limited number and extent of vessel movements associated with construction and decommissioning activities, it is considered that there is no potential for construction or decommissioning related vessel disturbance to lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA eider population.

CHANGES TO PREY AVAILABILITY

661. Seaducks (eider, goldeneye, common scoter, velvet scoter and long-tailed duck) feed on a range of prey species but often specialise on one or two prey items (often bivalves or other molluscs) in any one location (e.g. Leopold *et al*. 2001). However, seaduck are also opportunistic and capable of adjusting diet in response to changes in prey availability or composition (e.g. Forni *et al*. 2022).

662. During construction there is potential for these prey species to be affected by temporary habitat loss/disturbance and increased SSC and sediment deposition. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of seaduck prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

663. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

664. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of eider are present off the Firth and Tay and along the inner Firth of Forth, it is concluded that any impacts will be temporary and localised during construction and decommissioning and not lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA eider population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

665. Although eider are rated has having moderate to high sensitivity to vessel disturbance, disturbance from vessels undertaking annual inspection surveys and involved in cable reburial and repairs will be substantially reduced in both spatial and temporal extent compared to activities during construction and operation.

666. Ports used for maintenance activities within the Marine Scheme are yet to be confirmed and will be determined as part of competitive tendering processes. It is possible that a single Operations and Maintenance (O&M) base would be utilised, such as the port at nearby Blyth, with vessel movements unlikely to be noticeable above baseline vessel activity.

667. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of eider are present off the Firth and Tay and along the inner Firth of Forth, it is concluded that there is no potential for any adverse effects on the Outer Firth of Forth and St Andrews Bay Complex SPA eider population due to vessel disturbance during operation and maintenance.

CHANGES TO PREY AVAILABILITY

668. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, and colonisation of subsea structures could affect eider survival and productivity for the reasons outlined in Section 2.2.6.

669. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of eider are present off the Firth of Tay and along the inner Firth of Forth, it is concluded that there is no potential for any adverse effects on the Outer Firth of Forth and St Andrews Bay Complex SPA eider population due to changes in prey availability.

IN-COMBINATION EFFECTS

670. As detailed above, any effects from the Marine Scheme alone on the Outer Firth of Forth and St Andrews Bay Complex SPA eider population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

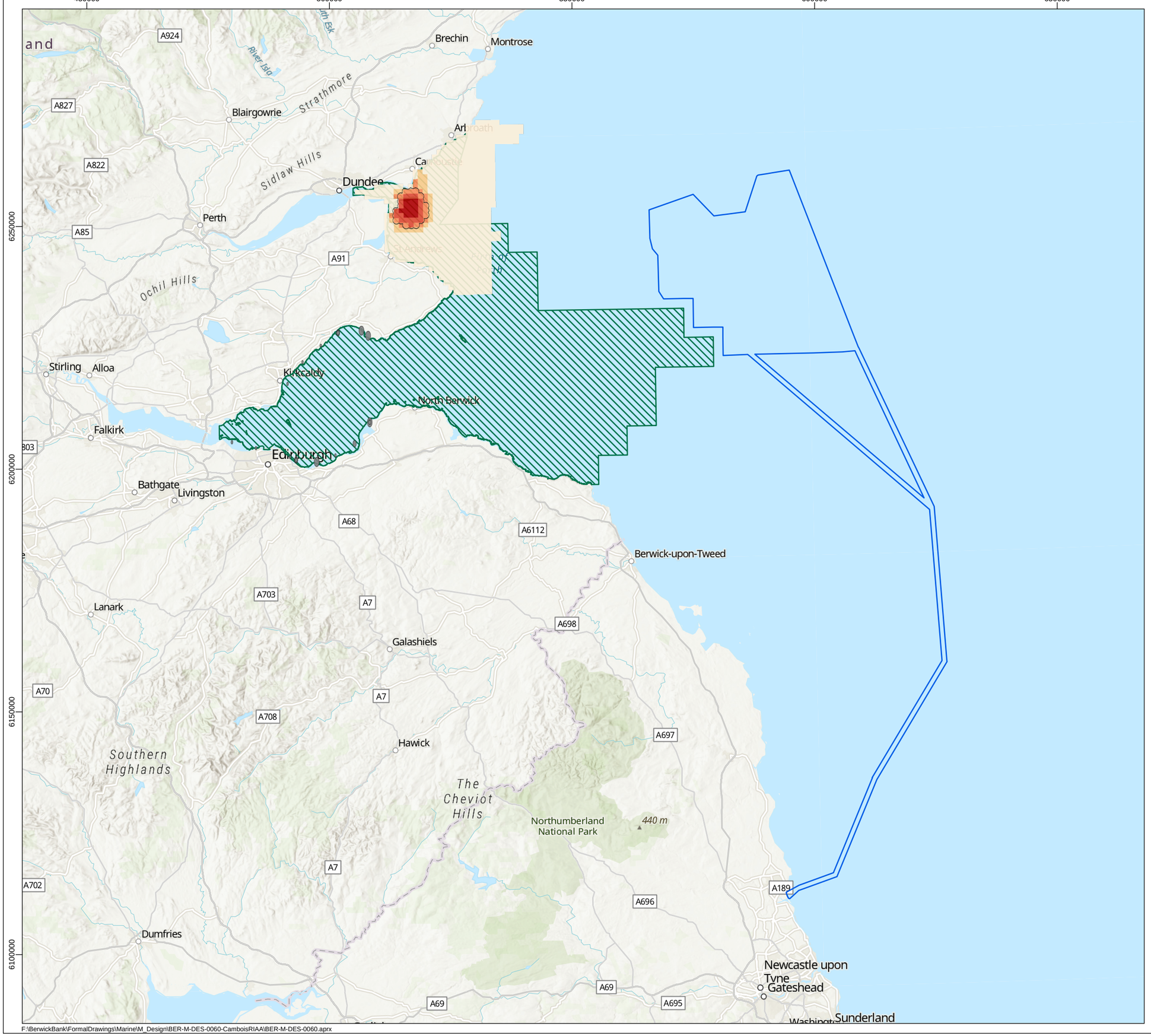
2.9.3. Assessment of Effects on Velvet Scoter

671. Within the Outer Firth of Forth and St. Andrew's Bay Complex SPA, velvet scoters are present between September and mid-April (NatureScot and JNCC 2022), with the highest densities recorded in the outer Firth of Tay; densities are generally lower in the Firth of Forth, with birds using inshore areas along the north (Fife) and south (Edinburgh and East Lothian) coasts (SNH and JNCC 2016, NatureScot and JNCC 2022).

672. The site reference population of 780 individuals (5 year mean 2006/7-2010/11) has been calculated from a multi-year programme of aerial, boat-based and land-based surveys (Lawson *et al*. 2015). Based on WeBS data, the peak mean population size has fluctuated annually but remains largely above the site reference population (SSER 2022b). This is reflected in the favourable condition of velvet scoter within the Outer Firth of Forth and St. Andrew's Bay Complex SPA.

673. Species-specific advice for velvet scoter is:

- *Maintain the population of non-breeding velvet scoter at a stable or increasing trend relative to the site reference population.*
- *Ensure velvet scoter continue to have access to, and can utilise all optimal habitats suitable for all relevant aspects of their life cycle associated with the site.*
- *Avoid significant disturbance to velvet scoter and ensure individuals can move safely between these areas within the site.*
- *Maintain the extent and distribution of the supporting habitats for velvet scoter within the site.*
- *Maintain the variety and abundance of food resources and the condition of supporting habitats and associated processes.*
- *Existing water quality should be maintained and any increase in nutrients, turbidity or contaminants where this could reduce supporting habitats and/or prey, should be avoided.*



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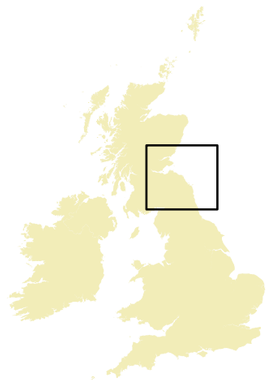

Legend

- Marine Scheme Boundary
- Outer Firth of Forth and St. Andrew's Bay Complex SPA
- Velvet scoter maximum curvature (10478)
- Distribution of Velvet scoter (10478)
  - 50 or less
  - 50 - 150
  - 150 or greater
- Velvet scoter count sectors selected by maximum curvature analysis (10478)
  - 72 - 200
  - 200 - 358
- Distribution of Velvet scoter (St Andrews Bay) (10478)
  - 0.25 or less
  - 0.25 - 0.50
  - 0.50 - 1.00
  - 1.00 - 2.00
  - 2 or greater

Rev	Date	Status	Drwn	Chkd	Appd
04	-	-	-	-	-
03	-	-	-	-	-
02	-	-	-	-	-
01	30/06/2023	ISSUED FOR REVIEW	RB	KC	KC

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Berwick Bank Wind Farm

Project

BERWICK BANK WIND FARM

Title

FIGURE 2
DISTRIBUTION OF VELVET SCOTER

0 5 10 20 nm
0 10 20 40 km

Scale	Plot Size	Datum	Projection
1:750,000	A3	WGS84	UTM30N

Drawing Number	Sheet No.
BER-M-DES-0060-02	001 OF 001

PROJECT ALONE: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

674. The Outer Firth of Forth and St Andrews Bay Complex SPA is located 2 km west of the Marine Scheme in Scottish waters at the closest point and 22 km west from the Marine Scheme in English Waters.

675. Velvet scoter are considered as having a relative high sensitivity to vessel disturbance (Garthe and Hüppop 2004, Furness *et al*. 2013, Fliessbach *et al*. 2019). However, given the distance between the Marine Scheme which lies entirely outwith the SPA, and the main aggregation of velvet scoter off the Firth of Tay, and to a lesser (but still substantial) degree also other known aggregations in the inner Firth of Forth, it is unlikely that significant numbers of velvet scoters use the area for foraging and/or roosting (Lawson *et al*. 2015, SNH 2015, SNH and JNCC 2016; Figure 2).

676. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

677. It is possible that a number of ports in the region may be utilised during construction and that vessels transiting to and from the Marine Scheme may pass through the Outer Firth of Forth and St. Andrew's Bay Complex SPA. However, given that the maximum number of vessels used during construction at any one time would be 20, and that not all vessels will be transiting at the same time, it is considered that vessel movements associated with the Marine Scheme are unlikely to be noticeable above baseline vessel activity in the region.

678. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

679. As outlined in Table 2-4, all vessels will adhere to the Scottish Marine Wildlife Watching Code and the Marine and Coastal Wildlife Code to further reduce any potential for vessel disturbance. Given the distance between the Marine Scheme and the main known aggregation of velvet scoter within the SPA, together with the limited number and extent of vessel movements associated with construction and decommissioning activities, it is considered that there is no potential for construction or decommissioning related vessel disturbance to lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA velvet scoter population.

CHANGES TO PREY AVAILABILITY

680. Seaducks (eider, goldeneye, common scoter, velvet scoter and long-tailed duck) feed on a range of prey species but often specialise on one or two prey items (often bivalves or other molluscs) in any

one location (e.g. Leopold *et al*. 2001). However, seaduck are also opportunistic and capable of adjusting diet in response to changes in prey availability or composition (e.g. Forni *et al*. 2022).

681. During construction there is potential for these prey species to be affected by temporary habitat loss/disturbance and increased SSC and sediment deposition. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of seaduck prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

682. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

683. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of velvet scoter are present off the Firth and Tay and along the inner Firth of Forth, it is concluded that any impacts will be temporary and localised during construction and decommissioning and not lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA velvet scoter population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

684. Although velvet scoter are rated has having high sensitivity to vessel disturbance, disturbance from vessels undertaking annual inspection surveys and involved in cable reburial and repairs will be substantially reduced in both spatial and temporal extent compared to activities during construction and operation.

685. Ports used for maintenance activities within the Marine Scheme are yet to be confirmed and will be determined as part of competitive tendering processes. It is possible that a single Operations and Maintenance (O&M) base would be utilised, such as the port at nearby Blyth, with vessel movements unlikely to be noticeable above baseline vessel activity.

686. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of velvet scoter are present off the Firth and Tay and along the inner Firth of Forth, it is concluded that there is no potential for any adverse effects on the Outer Firth of Forth and St Andrews Bay Complex SPA velvet scoter population due to vessel disturbance during operation and maintenance.

CHANGES TO PREY AVAILABILITY

687. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, and colonisation of subsea structures could affect velvet scoter survival and productivity for the reasons outlined in Section 2.2.6.

688. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of velvet scoter are present off the Firth of Tay and along the inner Firth of Forth, it is concluded that

there is no potential for any adverse effects on the Outer Firth of Forth and St Andrews Bay Complex SPA velvet scoter population due to changes in prey availability.

IN-COMBINATION EFFECTS

689. As detailed above, any effects from the Marine Scheme alone on the Outer Firth of Forth and St Andrews Bay Complex SPA velvet scoter population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

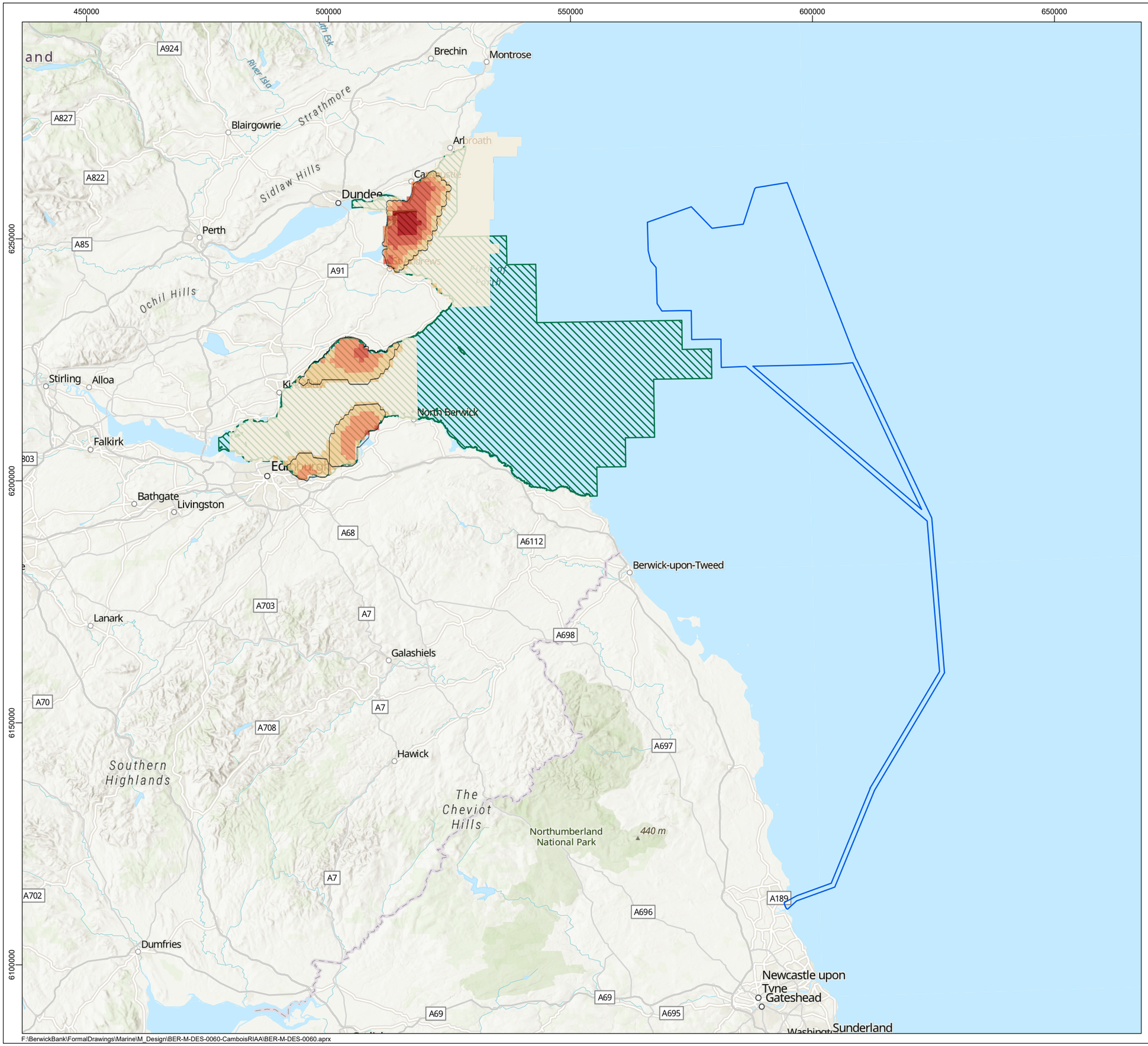
2.9.4. Assessment of Effects on Common Scoter

690. Within the Outer Firth of Forth and St. Andrew's Bay Complex SPA, common scoters are present between July and April (NatureScot and JNCC 2022), with high concentrations in the northerly part of the Outer Firth of Forth and St Andrews Bay Complex SPA, as well as concentrations around the Fife coastline between Kirkcaldy and Pittenweem, and along the Lothian coast between Edinburgh and North Berwick (NatureScot and JNCC 2022). Three common scoters were recorded within the BBWF array area during site-specific surveys, with two in June 2020 and one in January 2021 (BBWFL Offshore EIA Report, volume 3, appendix 11.1 (BBWFL, 2022c)).

691. The site reference population of 4,700 individuals (5 year mean 2001/02-2004/05) has been calculated based on a multi-year programme of aerial, boat-based and land-based surveys (Lawson *et al*. 2015). WeBS data indicate that the peak mean population size has increased above the site reference population since designation (SSER 2022b), reflected in the favourable condition of common scoter within the Outer Firth of Forth and St. Andrew's Bay Complex SPA.

692. Species-specific advice for common scoter is:

- *Maintain the population of non-breeding common scoter at a stable or increasing trend relative to the site reference population.*
- *Ensure common scoter continue to have access to, and can utilise all optimal habitats suitable for all relevant aspects of their life cycle associated with the site.*
- *Avoid significant disturbance to common scoter and ensure individuals can move safely between these areas within the site.*
- *Maintain the extent and distribution of the supporting habitats for common scoter within the site.*
- *Maintain the variety and abundance of food resources and the condition of supporting habitats and associated processes.*
- *Existing water quality should be maintained and any increase in nutrients, turbidity or contaminants where this could reduce supporting habitats and/or prey, should be avoided.*



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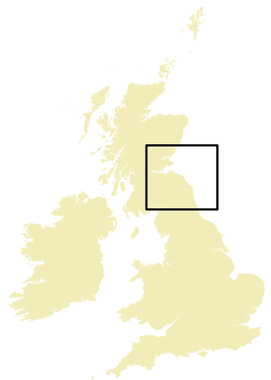


Legend

- Marine Scheme Boundary
- Outer Firth of Forth and St. Andrew's Bay Complex SPA
- Common scoter maximum curvature (10478)

Distribution of Common scoter (St Andrews Bay) (10478)
- 2 or less
- 2 - 5
- 5 - 10
- 10 - 20
- 20 or greater

Distribution of Common scoter (Outer Firth of Forth) (10478)
- 2 or less
- 2 - 5
- 5 - 10
- 10 - 20
- 20 or greater

Rev	Date	Status	Drwn	Chkd	Appd
04	-	-	-	-	-
03	-	-	-	-	-
02	-	-	-	-	-
01	30/06/2023	ISSUED FOR REVIEW	RB	KC	KC

sse Renewables

Berwick Bank Wind Farm

Project

BERWICK BANK WIND FARM

Title

FIGURE 3
DISTRIBUTION OF COMMON SCOTER

0 5 10 20 nm
0 10 20 40 km

N

Scale	Plot Size	Datum	Projection
1:750,000	A3	WGS84	UTM30N

Drawing Number	Sheet No.
BER-M-DES-0060-03	001 OF 001

PROJECT ALONE: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

693. The Outer Firth of Forth and St Andrews Bay Complex SPA is located 2 km west of the Marine Scheme in Scottish waters at the closest point and 22 km west from the Marine Scheme in English Waters.

694. Common scoter are considered as having a relative high sensitivity to vessel disturbance (Garthe and Hüppop 2004, Furness *et al*. 2013, Fliessbach *et al*. 2019). However, given the distance between the Marine Scheme which lies entirely outwith the SPA, and known aggregations of common scoters along the inner coastlines of the Firth of Forth and off the Firth of Tay, it is unlikely that significant numbers of common scoters use the area for foraging and/or roosting (Lawson *et al*. 2015, SNH 2015, SNH and JNCC 2016; Figure 3).

695. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

696. It is possible that a number of ports in the region may be utilised during construction and that vessels transiting to and from the Marine Scheme may pass through the Outer Firth of Forth and St. Andrew's Bay Complex SPA. However, given that the maximum number of vessels used during construction at any one time would be 20, and that not all vessels will be transiting at the same time, it is considered that vessel movements associated with the Marine Scheme are unlikely to be noticeable above baseline vessel activity in the region.

697. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

698. As outlined in Table 2-4, all vessels will adhere to the Scottish Marine Wildlife Watching Code and the Marine and Coastal Wildlife Code to further reduce any potential for vessel disturbance. Given the distance between the Marine Scheme and the main known aggregation of common scoter within the SPA, together with the limited number and extent of vessel movements associated with construction and decommissioning activities, it is considered that there is no potential for construction or decommissioning related vessel disturbance to lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA common scoter population.

CHANGES TO PREY AVAILABILITY

699. Seaducks (eider, goldeneye, common scoter, velvet scoter and long-tailed duck) feed on a range of prey species but often specialise on one or two prey items (often bivalves or other molluscs) in any one location (e.g. Leopold *et al*. 2001). However, seaduck are also opportunistic and capable of adjusting diet in response to changes in prey availability or composition (e.g. Forni *et al*. 2022).

700. During construction there is potential for these prey species to be affected by temporary habitat loss/disturbance and increased SSC and sediment deposition. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of seaduck prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

701. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

702. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of common scoter are present off the Firth and Tay and along the inner Firth of Forth, it is concluded that any impacts will be temporary and localised during construction and decommissioning and not lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA common scoter population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

703. Although common scoter are rated has having high sensitivity to vessel disturbance, disturbance from vessels undertaking annual inspection surveys and involved in cable reburial and repairs will be substantially reduced in both spatial and temporal extent compared to activities during construction and operation.

704. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of common scoter are present off the Firth and Tay and along the inner Firth of Forth, it is concluded that there is no potential for any adverse effects on the Outer Firth of Forth and St Andrews Bay Complex SPA common scoter population due to vessel disturbance during operation and maintenance.

CHANGES TO PREY AVAILABILITY

705. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, and colonisation of subsea structures could affect common scoter survival and productivity for the reasons outlined in Section 2.2.6.

706. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of common scoter are present off the Firth of Tay and along the inner Firth of Forth, it is concluded that there is no potential for any adverse effects on the Outer Firth of Forth and St Andrews Bay Complex SPA common scoter population due to changes in prey availability.

IN-COMBINATION EFFECTS

707. As detailed above, any effects from the Marine Scheme alone on the Outer Firth of Forth and St Andrews Bay Complex SPA common scoter population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

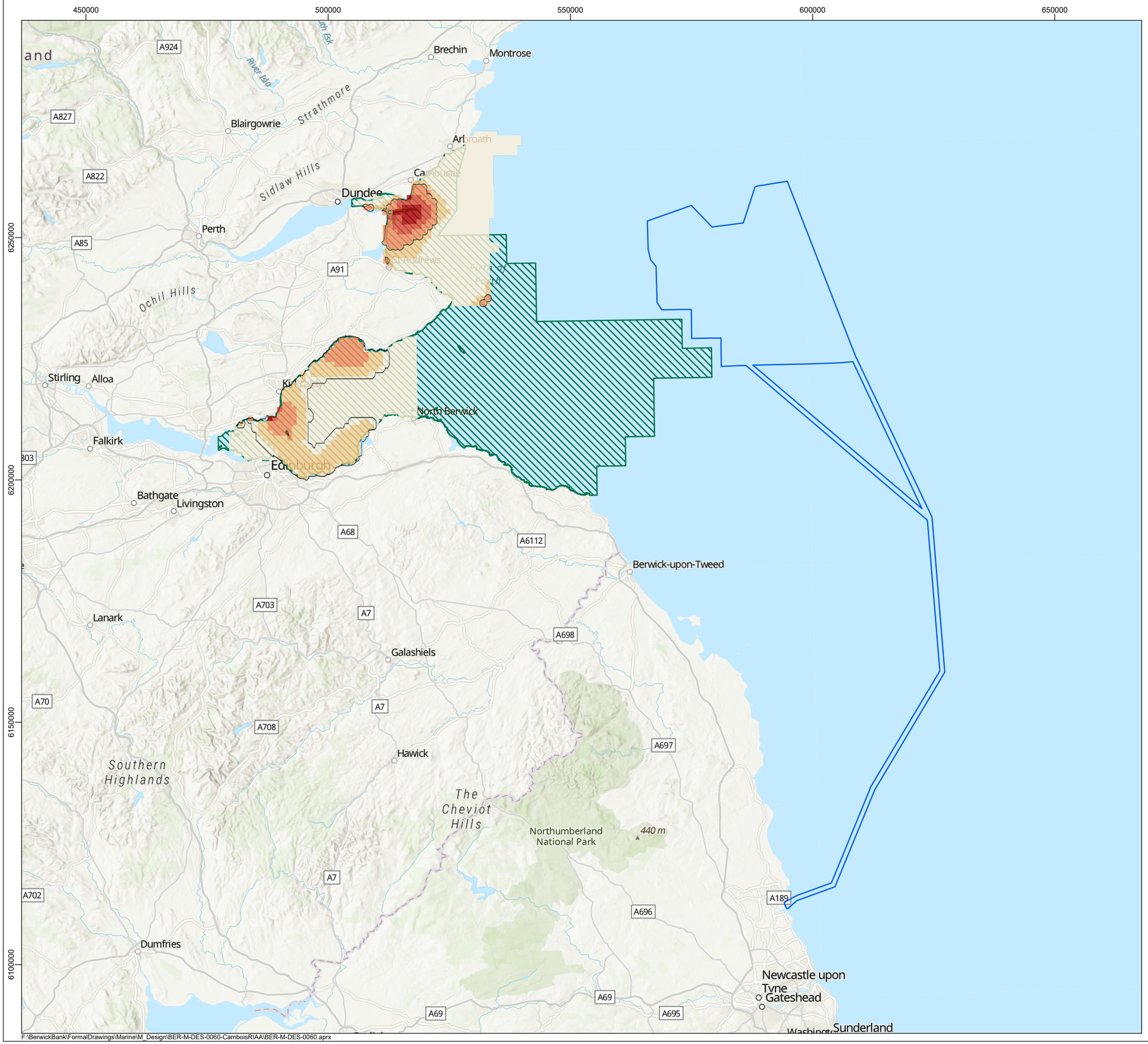
2.9.5. Assessment of Effects on Long-tailed Duck

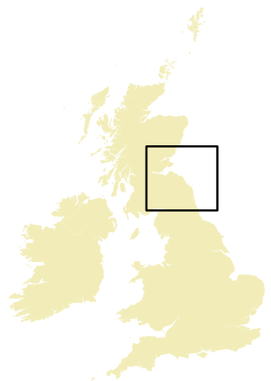
708. In the non-breeding season, long-tailed duck in the Outer Firth of Forth and St Andrews Bay Complex SPA have their highest concentrations in the Firth of Tay and the northern and central sections of the Firth of Forth (Figure 4). The waters are used for foraging, roosting and maintenance activities, with birds present in the SPA from mid-September until late April (NatureScot and JNCC 2022).

709. The site reference population of 1,950 individuals (5 year mean 2001/02-2004/05) has been calculated based on a multi-year programme of aerial, boat-based and land-based surveys (Lawson *et al*. 2015). WeBS data indicate that the peak mean population size has increased above the site reference population since 2016/17 (SSER 2022b), reflected in the favourable condition of long-tailed duck within the Outer Firth of Forth and St. Andrew's Bay Complex SPA.

710. Species-specific advice for long-tailed duck is:

- *Maintain the population of non-breeding long-tailed duck at a stable or increasing trend relative to the site reference population.*
- *Ensure long-tailed duck continue to have access to, and can utilise all optimal habitats suitable for all relevant aspects of their life cycle associated with the site.*
- *Avoid significant disturbance to long-tailed duck and ensure individuals can move safely between these areas within the site.*
- *Maintain the extent and distribution of the supporting habitats for long-tailed duck within the site.*
- *Maintain the variety and abundance of food resources and the condition of supporting habitats and associated processes.*
- *Existing water quality should be maintained and any increase in nutrients, turbidity or contaminants where this could reduce supporting habitats and/or prey, should be avoided.*





Legend

- Marine Scheme Boundary
- Outer Firth of Forth and St. Andrew's Bay Complex SPA
- Long-tailed duck maximum curvature (10478)

Distribution of Long-tailed duck (St Andrews Bay) (10478)
- 1 or less
- 1 - 2
- 2 - 5
- 5 - 10
- 10 or greater

Distribution of Long-tailed duck (Outer Firth of Forth) (10478)
- 1 or less
- 1 - 2
- 2 - 5
- 5 - 10
- 10 or greater

Rev	Date	Status	Drwn	Chkd	Appd
04	-	-	-	-	-
03	-	-	-	-	-
02	-	-	-	-	-
01	30/06/2023	ISSUED FOR REVIEW	RB	KC	KC

sse Renewables

Berwick Bank Wind Farm

Project

BERWICK BANK WIND FARM

Title

FIGURE 4
DISTRIBUTION OF LONG-TAILED DUCK

0 5 10 20 nm
0 10 20 40 km

N

Scale	Plot Size	Datum	Projection
1:750,000	A3	WGS84	UTM30N

Drawing Number	Sheet No.
BER-M-DES-0060-04	001 OF 001

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PROJECT ALONE: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

711. The Outer Firth of Forth and St Andrews Bay Complex SPA is located 2 km west of the Marine Scheme in Scottish waters at the closest point and 22 km west from the Marine Scheme in English Waters.

712. Long-tailed duck are considered as having a moderate sensitivity to vessel disturbance (Garthe and Hüppop 2004, Furness *et al*. 2013, Fliessbach *et al*. 2019). However, given the distance between the Marine Scheme which lies entirely outwith the SPA, and known aggregations of long-tailed ducks along the inner coastlines of the Firth of Forth and off the Firth of Tay, it is unlikely that significant numbers of long-tailed ducks use the area for foraging and/or roosting (Lawson *et al*. 2015, SNH 2015, SNH and JNCC 2016; Figure 4).

713. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

714. It is possible that a number of ports in the region may be utilised during construction and that vessels transiting to and from the Marine Scheme may pass through the Outer Firth of Forth and St. Andrew's Bay Complex SPA. However, given that the maximum number of vessels used during construction at any one time would be 20, and that not all vessels will be transiting at the same time, it is considered that vessel movements associated with the Marine Scheme are unlikely to be noticeable above baseline vessel activity in the region.

715. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

716. As outlined in Table 2-4, all vessels will adhere to the Scottish Marine Wildlife Watching Code and the Marine and Coastal Wildlife Code to further reduce any potential for vessel disturbance. Given the distance between the Marine Scheme and the main known aggregation of long-tailed ducks within the SPA, together with the limited number and extent of vessel movements associated with construction and decommissioning activities, it is considered that there is no potential for construction or decommissioning related vessel disturbance to lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA long-tailed duck population.

CHANGES TO PREY AVAILABILITY

717. Seaducks (eider, goldeneye, common scoter, velvet scoter and long-tailed duck) feed on a range of prey species but often specialise on one or two prey items (often bivalves or other molluscs) in any one location (e.g. Leopold *et al*. 2001). However, seaduck are also opportunistic and capable of adjusting diet in response to changes in prey availability or composition (e.g. Forni *et al*. 2022).

718. During construction there is potential for these prey species to be affected by temporary habitat loss/disturbance and increased SSC and sediment deposition. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of seaduck prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

719. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

720. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of long-tailed duck are present off the Firth and Tay and along the inner Firth of Forth, it is concluded that any impacts will be temporary and localised during construction and decommissioning and not lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA long-tailed duck population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

721. Although long-tailed duck are rated has having high sensitivity to vessel disturbance, disturbance from vessels undertaking annual inspection surveys and involved in cable reburial and repairs will be substantially reduced in both spatial and temporal extent compared to activities during construction and operation.

722. Ports used for maintenance activities within the Marine Scheme are yet to be confirmed and will be determined as part of competitive tendering processes. It is possible that a single Operations and Maintenance (O&M) base would be utilised, such as the port at nearby Blyth, with vessel movements unlikely to be noticeable above baseline vessel activity.

723. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of long-tailed duck are present off the Firth and Tay and along the inner Firth of Forth, it is concluded that there is no potential for any adverse effects on the Outer Firth of Forth and St Andrews Bay Complex SPA long-tailed duck population due to vessel disturbance during operation and maintenance.

CHANGES TO PREY AVAILABILITY

724. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, and colonisation of subsea structures could affect long-tailed duck survival and productivity for the reasons outlined in Section 2.2.6.

725. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of long-tailed duck are present off the Firth of Tay and along the inner Firth of Forth, it is concluded that there is no potential for any adverse effects on the Outer Firth of Forth and St Andrews Bay Complex SPA long-tailed duck population due to changes in prey availability.

IN-COMBINATION EFFECTS

726. As detailed above, any effects from the Marine Scheme alone on the Outer Firth of Forth and St Andrews Bay Complex SPA long-tailed duck population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

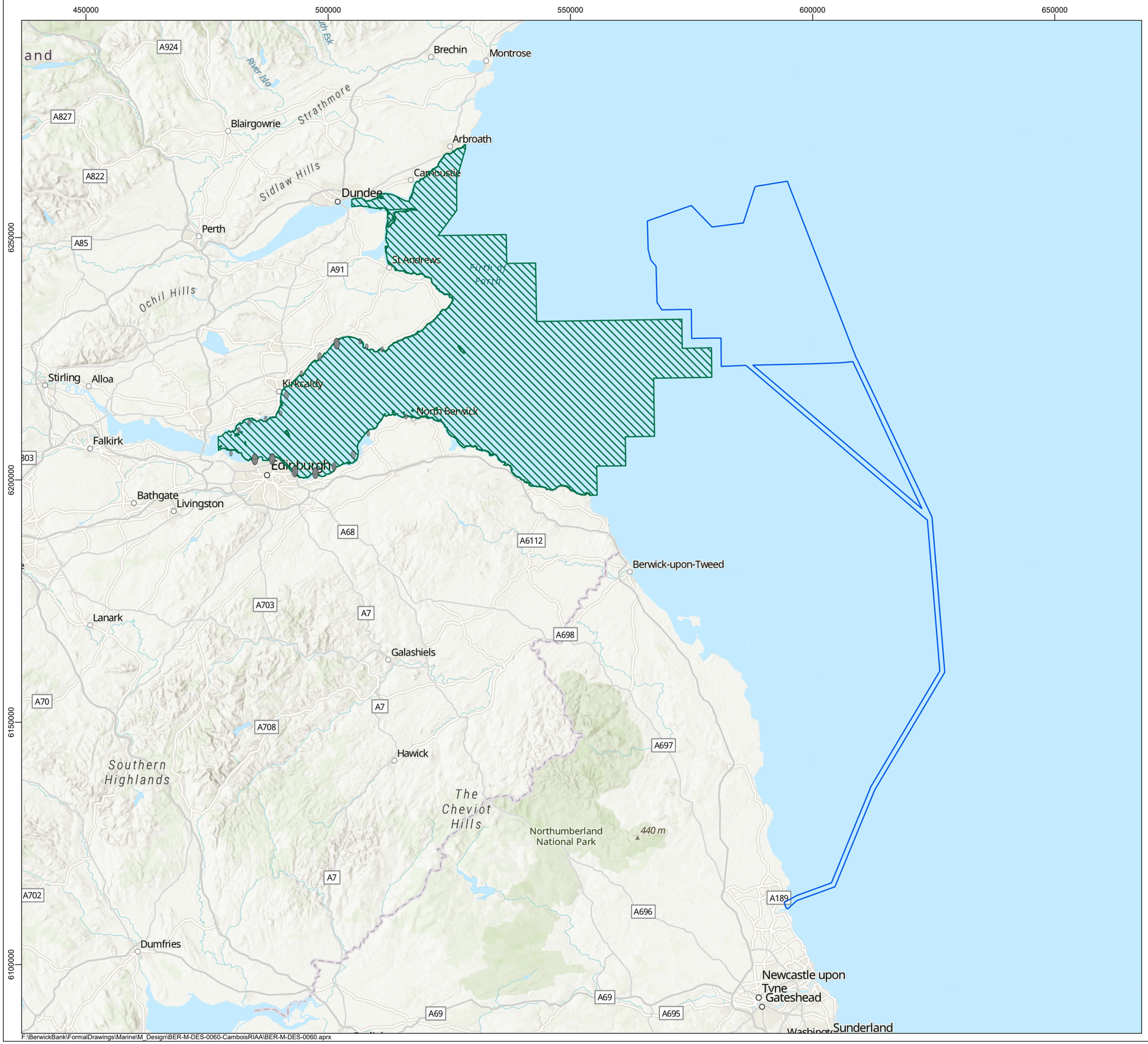
2.9.6. Assessment of Effects on Goldeneye

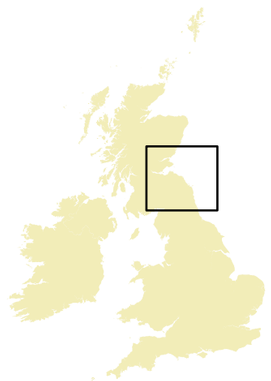
727. Within the Outer Firth of Forth and St Andrews Bay Complex SPA, goldeneyes are distributed predominately within the shallow waters of the Firth of Forth coastlines between September and mid-April (NatureScot and JNCC 2022).

728. The site reference population of 590 individuals (5 year mean 2006/07-2010/11) has been calculated based on a multi-year programme of aerial, boat-based and land-based surveys (Lawson *et al*. 2015). WeBS data indicates that the peak mean population size has remained above the site reference population since at least 2001 (SSER, 2022b), reflected in the favourable condition of goldeneye within the Outer Firth of Forth and St. Andrew's Bay Complex SPA..

729. Species-specific advice for goldeneye is:

- *Maintain the population of non-breeding goldeneye at a stable or increasing trend relative to the site reference population.*
- *Ensure goldeneye continue to have access to, and can utilise all optimal habitats suitable for all relevant aspects of their life cycle associated with the site.*
- *Avoid significant disturbance to goldeneye and ensure individuals can move safely between these areas within the site.*
- *Maintain the extent and distribution of the supporting habitats for goldeneye within the site.*
- *Maintain the variety and abundance of food resources and the condition of supporting habitats and associated processes.*
- *Existing water quality should be maintained and any increase in nutrients, turbidity or contaminants where this could reduce supporting habitats and/or prey, should be avoided.*





Legend

- Marine Scheme Boundary
- Outer Firth of Forth and St. Andrew's Bay Complex SPA

Distribution of Common goldeneye (10478)

- × 0
- 30 or less
- 30 - 75
- 75 or greater

Common goldeneye count sectors selected by maximum curvature analysis (10478)

- 0 - 75
- 75 - 262

Rev	Date	Status	Drwn	Chkd	Appd
04	-	-	-	-	-
03	-	-	-	-	-
02	-	-	-	-	-
01	30/06/2023	ISSUED FOR REVIEW	RB	KC	KC

sse Renewables

Berwick Bank Wind Farm

Project

BERWICK BANK WIND FARM

Title

FIGURE 5
DISTRIBUTION OF COMMON GOLDENEYE

0 5 10 20 nm
0 10 20 40 km

N

Scale	Plot Size	Datum	Projection
1:750,000	A3	WGS84	UTM30N

Drawing Number: BER-M-DES-0060-05

Sheet No.: 001 OF 001

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PROJECT ALONE: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

730. The Outer Firth of Forth and St Andrews Bay Complex SPA is located 2 km west of the Marine Scheme in Scottish waters at the closest point and 22 km west from the Marine Scheme in English Waters.

731. Goldeneye are considered as having a moderate to high sensitivity to vessel disturbance (Furness *et al*. 2013). However, given the distance between the Marine Scheme which lies entirely outwith the SPA, and known aggregations of goldeneyes along the inner coastlines of the Firth of Forth, it is unlikely that significant numbers of goldeneyes use the area for foraging and/or roosting (Lawson *et al*. 2015, SNH 2015, SNH and JNCC 2016; Figure 5).

732. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

733. It is possible that a number of ports in the region may be utilised during construction and that vessels transiting to and from the Marine Scheme may pass through the Outer Firth of Forth and St. Andrew's Bay Complex SPA. However, given that the maximum number of vessels used during construction at any one time would be 20, and that not all vessels will be transiting at the same time, it is considered that vessel movements associated with the Marine Scheme are unlikely to be noticeable above baseline vessel activity in the region.

734. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

735. As outlined in Table 2-4, all vessels will adhere to the Scottish Marine Wildlife Watching Code and the Marine and Coastal Wildlife Code to further reduce any potential for vessel disturbance. Given the distance between the Marine Scheme and the main known aggregation of goldeneye within the SPA, together with the limited number and extent of vessel movements associated with construction and decommissioning activities, it is considered that there is no potential for construction or decommissioning related vessel disturbance to lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA goldeneye population.

CHANGES TO PREY AVAILABILITY

736. Goldeneye feed a wide range of prey items including bivalves, gastropods and crustaceans and habitats capable of supporting suitable prey items occur widely across the SPA (NatureScot and JNCC 2022).

737. During construction there is potential for these prey species to be affected by temporary habitat loss/disturbance and increased SSC and sediment deposition. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of seaduck prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology

738. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to

be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

739. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of goldeneye are present and along the inner Firth of Forth, it is concluded that any impacts will be temporary and localised during construction and decommissioning and not lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA goldeneye population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

740. Although goldeneye are rated has having moderate to high sensitivity to vessel disturbance, disturbance from vessels undertaking annual inspection surveys and involved in cable reburial and repairs will be substantially reduced in both spatial and temporal extent compared to activities during construction and operation.

741. Ports used for maintenance activities within the Marine Scheme are yet to be confirmed and will be determined as part of competitive tendering processes. It is possible that a single Operations and Maintenance (O&M) base would be utilised, such as the port at nearby Blyth, with vessel movements unlikely to be noticeable above baseline vessel activity.

742. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of goldeneye are present along the inner Firth of Forth, it is concluded that there is no potential for any adverse effects on the Outer Firth of Forth and St Andrews Bay Complex SPA goldeneye population due to vessel disturbance during operation and maintenance.

CHANGES TO PREY AVAILABILITY

743. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, and colonisation of subsea structures could affect goldeneye survival and productivity for the reasons outlined in Section 2.2.6.

744. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of goldeneye are present along the inner Firth of Forth, it is concluded that there is no potential for any adverse effects on the Outer Firth of Forth and St Andrews Bay Complex SPA goldeneye population due to changes in prey availability.

IN-COMBINATION EFFECTS

745. As detailed above, any effects from the Marine Scheme alone on the Outer Firth of Forth and St Andrews Bay Complex SPA goldeneye population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

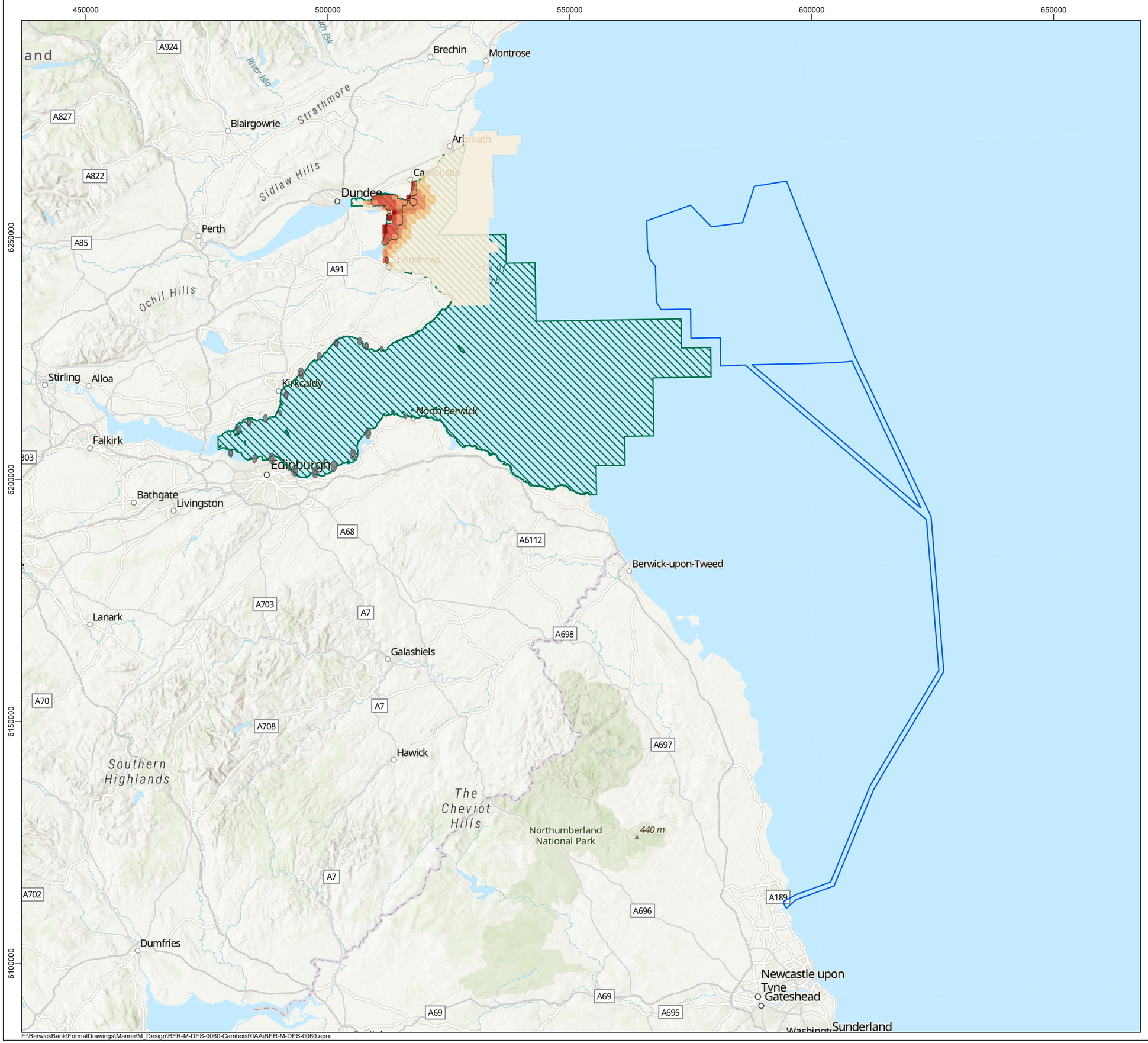
2.9.7. Assessment of Effects on Red-Breasted Merganser

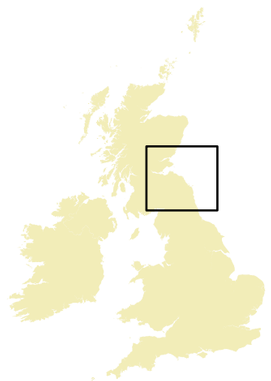
746. Within the Outer Firth of Forth and St Andrews Bay Complex SPA red-breasted mergansers are present throughout the year (NatureScot and JNCC 2022). Their non-breeding season is from mid-August to late March, with the wintering population in the SPA including birds from breeding grounds within Britain and Ireland, Iceland, and mainland Europe (Wernham *et al*. 2002; Wright *et al*. 2012). The distribution of red-breasted mergansers within the Outer Firth of Forth and St Andrews Bay Complex SPA is widespread along the coast within the Firth of Forth and has another area of high density at the mouth of the Firth of Tay.

747. The site reference population of 430 individuals (5 year mean 2006/07-2010/11) has been calculated based on a multi-year programme of aerial, boat-based and land-based surveys (Lawson *et al*. 2015). WeBS data indicates that the peak mean population size has fluctuated but remained above the site reference population since at least 2001 (SSER, 2022b), reflected in the favourable condition of red-breasted merganser within the Outer Firth of Forth and St. Andrew's Bay Complex SPA.

748. Species-specific advice for red-breasted merganser is:

- *Maintain the population of non-breeding red-breasted merganser at a stable or increasing trend relative to the site reference population.*
- *Ensure red-breasted merganser continue to have access to, and can utilise all optimal habitats suitable for all relevant aspects of their life cycle associated with the site.*
- *Avoid significant disturbance to red-breasted merganser and ensure individuals can move safely between these areas within the site.*
- *Maintain the extent and distribution of the supporting habitats for red-breasted merganser within the site.*
- *Maintain the variety and abundance of food resources and the condition of supporting habitats and associated processes.*
- *Existing water quality should be maintained and any increase in nutrients, turbidity or contaminants where this could reduce supporting habitats and/or prey, should be avoided.*





Legend

- Marine Scheme Boundary
- Outer Firth of Forth and St. Andrew's Bay Complex SPA
- Red-breasted merganser maximum curvature (10478)
- Red-breasted merganser count sectors selected by maximum curvature analysis (10478)
  - 21 - 50
  - 50 - 73
- Distribution of Red-breasted merganser (10478)
  - 0
  - 15 or less
  - 15 - 30
  - 30 or greater
- Distribution of Red-breasted merganser (St Andrews Bay) (10478)
  - 0.25 or less
  - 0.25 - 0.75
  - 0.75 - 1.50
  - 1.50 - 3.00
  - 3 or greater

Rev	Date	Status	Drwn	Chkd	Appd
04	-	-	-	-	-
03	-	-	-	-	-
02	-	-	-	-	-
01	22/05/2023	ISSUED FOR REVIEW	RB	EN	KC

sse Renewables

Berwick Bank Wind Farm

Project

BERWICK BANK WIND FARM

Title

FIGURE 6
DISTRIBUTION OF RED-BREASTED MERGANSER

0 5 10 20 nm
0 10 20 40 km

N

Scale	Plot Size	Datum	Projection
1:750,000	A3	WGS84	UTM30N

Drawing Number: BER-M-DES-0060-06

Sheet No.: 001 OF 001

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PROJECT ALONE: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

749. The Outer Firth of Forth and St Andrews Bay Complex SPA is located 2 km west of the Marine Scheme in Scottish waters at the closest point and 22 km west from the Marine Scheme in English Waters.

750. Red-breasted mergansers are considered as having a relative high sensitivity to vessel disturbance (Fliessbach *et al*. 2019). However, given the distance between the Marine Scheme which lies entirely outwith the SPA, and known aggregations of red-breasted merganser off the Firth of Tay and along the inner coastlines of the Firth of Forth, it is unlikely that significant numbers of red-breasted merganser use the area for foraging and/or roosting (Lawson *et al*. 2015, SNH 2015, SNH and JNCC 2016; Figure 6).

751. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

752. It is possible that a number of ports in the region may be utilised during construction and that vessels transiting to and from the Marine Scheme may pass through the Outer Firth of Forth and St. Andrew's Bay Complex SPA. However, given that the maximum number of vessels used during construction at any one time would be 20, and that not all vessels will be transiting at the same time, it is considered that vessel movements associated with the Marine Scheme are unlikely to be noticeable above baseline vessel activity in the region.

753. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

754. As outlined in Table 2-4, all vessels will adhere to the Scottish Marine Wildlife Watching Code and the Marine and Coastal Wildlife Code to further reduce any potential for vessel disturbance. Given the distance between the Marine Scheme and the main known aggregation of red-breasted marganser within the SPA, together with the limited number and extent of vessel movements associated with construction and decommissioning activities, it is considered that there is no potential for construction or decommissioning related vessel disturbance to lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA red-breasted merganser population.

CHANGES TO PREY AVAILABILITY

755. Red-breasted merganser feed primarily on a range of small fish species (del Hoyo *et al*. 1996).

756. During construction there is potential for these prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition, and increases in underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

757. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to

be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

758. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of red-breasted merganser are present off the Firth and Tay and along the inner Firth of Forth, it is concluded that any impacts will be temporary and localised during construction and decommissioning and not lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA red-breasted merganser population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

759. Although red-breasted merganser are rated has having high sensitivity to vessel disturbance, disturbance from vessels undertaking annual inspection surveys and involved in cable reburial and repairs will be substantially reduced in both spatial and temporal extent compared to activities during construction and operation.

760. Ports used for maintenance activities within the Marine Scheme are yet to be confirmed and will be determined as part of competitive tendering processes. It is possible that a single Operations and Maintenance (O&M) base would be utilised, such as the port at nearby Blyth, with vessel movements unlikely to be noticeable above baseline vessel activity.

761. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of red-breasted merganser are present off the Firth and Tay and along the inner Firth of Forth, it is concluded that there is no potential for any adverse effects on the Outer Firth of Forth and St Andrews Bay Complex SPA red-breasted merganser population due to vessel disturbance during operation and maintenance.

CHANGES TO PREY AVAILABILITY

762. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance and increased SSC and deposition during repairs and reburial could affect red-breasted merganser survival and productivity for the reasons outlined in Section 2.2.6.

763. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of red-breasted merganser are present off the Firth of Tay and along the inner Firth of Forth, it is concluded that there is no potential for any adverse effects on the Outer Firth of Forth and St Andrews Bay Complex SPA red-breasted merganser population due to changes in prey availability.

IN-COMBINATION EFFECTS

764. As detailed above, any effects from the Marine Scheme alone on the Outer Firth of Forth and St Andrews Bay Complex SPA red-breasted merganser population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

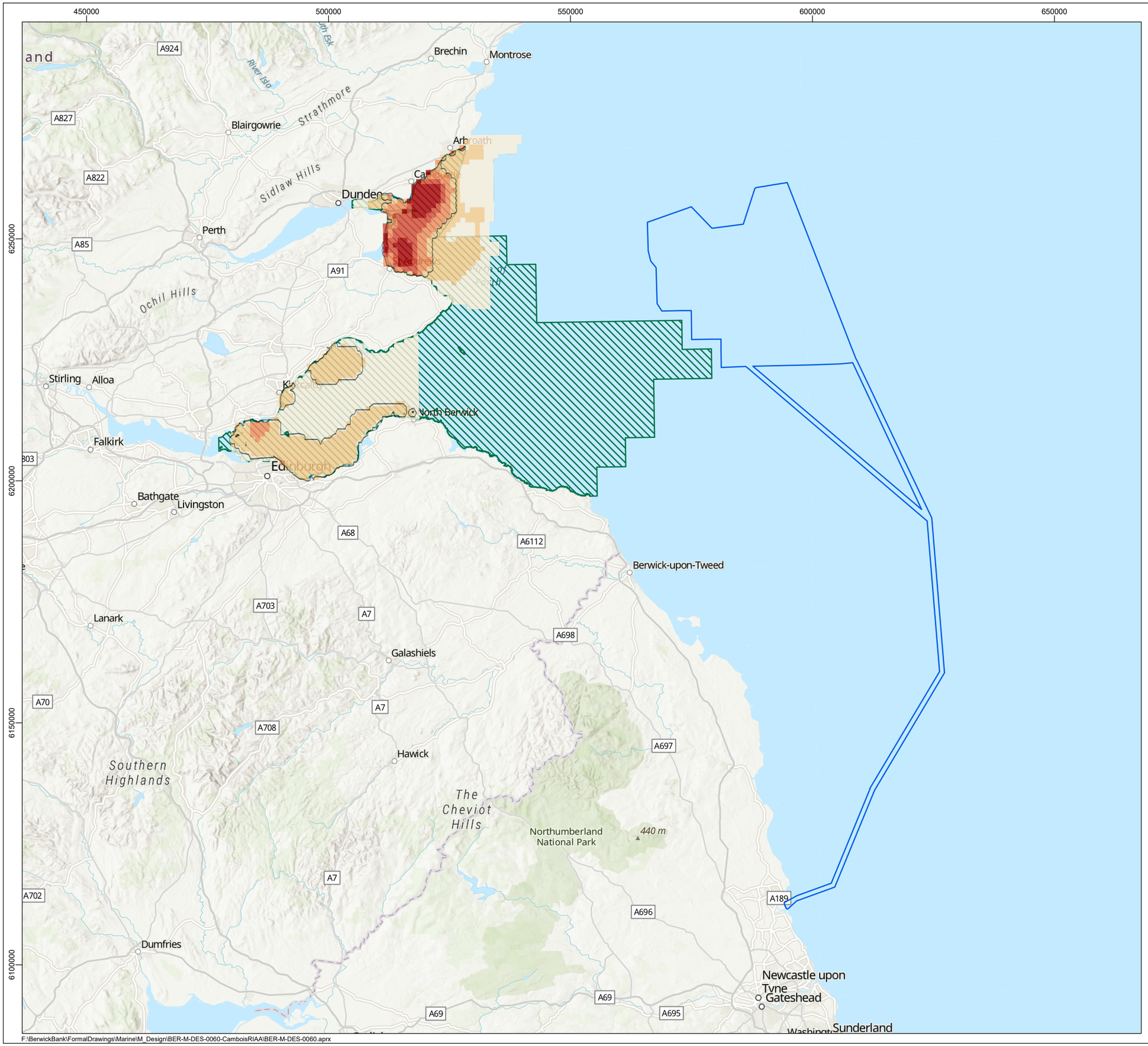
2.9.8. Assessment of Effects on Red-Throated Diver

765. Within the Outer Firth of Forth and St. Andrew's Bay Complex SPA, red-throated divers are present between mid-September and late March, with high concentrations recorded off St Andrews Bay and the Firth of Tay (NatureScot and JNCC 2022; Figure 7). Red-throated divers were occasionally recorded within the BBWF array area in late spring and early winter, with a peak density of 0.05 birds/km^2 (95%CI 0.02 – 0.09) occurring in November 2020 to the north-west of the BBWF array area (BBWFL Offshore EIA Report, volume 3, appendix 11.1 (BBWFL, 2022c)).

766. The site reference population of 850 individuals (4 year mean 2001/02-2004/05) has been calculated based on a multi-year programme of aerial, boat-based and land-based surveys (Lawson *et al*. 2015). WeBS data indicate that the peak mean population size has remained relatively stable since 2001, although there may have been a slight decrease over the years (SSER 2022b). Red-throated divers are considered to be in favourable condition within the Outer Firth of Forth and St. Andrew's Bay Complex

767. Species-specific advice for red-throated diver is:

- *Maintain the population of non-breeding red-throated diver at a stable or increasing trend relative to the site reference population.*
- *Ensure red-throated diver continue to have access to, and can utilise all optimal habitats suitable for all relevant aspects of their life cycle associated with the site.*
- *Avoid significant disturbance to red-throated diver and ensure individuals can move safely between these areas within the site.*
- *Maintain the extent and distribution of the supporting habitats for red-throated diver within the site.*
- *Maintain the variety and abundance of food resources and the condition of supporting habitats and associated processes.*
- *Existing water quality should be maintained and any increase in nutrients, turbidity or contaminants where this could reduce supporting habitats and/or prey, should be avoided.*



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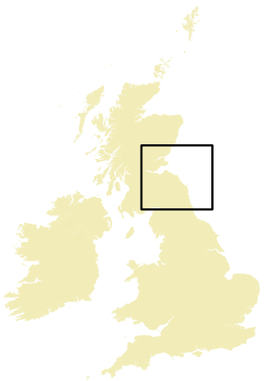


Legend

- Marine Scheme Boundary
- Outer Firth of Forth and St. Andrew's Bay Complex SPA
- Red-throated diver maximum curvature (10478)

Distribution of Red-throated diver (St Andrews Bay) (10478)

- 0.25 or less
- 0.25 - 0.75
- 0.75 - 1.50
- 1.50 - 2.00
- 2 or greater

Distribution of Red-throated diver (Firth of Forth) (10478)

- 0.25 or less
- 0.25 - 0.75
- 0.75 - 1.50
- 1.50 - 2.00
- 2 or greater

Rev	Date	Status	Drwn	Chkd	Appd
04	-	-	-	-	-
03	-	-	-	-	-
02	-	-	-	-	-
01	30/06/2023	ISSUED FOR REVIEW	RB	KC	KC

sse Renewables

Berwick Bank Wind Farm

Project

BERWICK BANK WIND FARM

Title

FIGURE 7
DISTRIBUTION OF RED-THROATED DIVER

0 5 10 20 nm
0 10 20 40 km

N

Scale	Plot Size	Datum	Projection
1:750,000	A3	WGS84	UTM30N

Drawing Number: BER-M-DES-0060-07

Sheet No.: 001 OF 001

PROJECT ALONE: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

768. The Outer Firth of Forth and St Andrews Bay Complex SPA is located 2 km west of the Marine Scheme in Scottish waters at the closest point and 22 km west from the Marine Scheme in English Waters.

769. Red-throated divers are considered as having a relative high sensitivity to vessel disturbance (Garthe and Hüppop 2004, Furness *et al*. 2013, Fliessbach *et al*. 2019). However, given the distance between the Marine Scheme which lies entirely outwith the SPA, and known aggregations of red-throated diver off the Firth of Tay, and to a lesser (but still substantial) degree also along the inner Firth of Forth, it is unlikely that significant numbers of red-throated diver use the area for foraging and/or roosting (Lawson *et al*. 2015, SNH 2015, SNH and JNCC 2016; Figure 7).

770. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

771. It is possible that a number of ports in the region may be utilised during construction and that vessels transiting to and from the Marine Scheme may pass through the Outer Firth of Forth and St. Andrew's Bay Complex SPA. However, given that the maximum number of vessels used during construction at any one time would be 20, and that not all vessels will be transiting at the same time, it is considered that vessel movements associated with the Marine Scheme are unlikely to be noticeable above baseline vessel activity in the region.

772. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

773. As outlined in Table 2-4, all vessels will adhere to the Scottish Marine Wildlife Watching Code and the Marine and Coastal Wildlife Code to further reduce any potential for vessel disturbance. Given the distance between the Marine Scheme and the main known aggregation of re-throated diver within the SPA, together with the limited number and extent of vessel movements associated with construction and decommissioning activities, it is considered that there is no potential for construction or decommissioning related vessel disturbance to lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA red-throated diver population.

CHANGES TO PREY AVAILABILITY

774. Red-throated divers appear capable of utilising a range of marine habitats and prey. They are generalist opportunistic feeders favouring pelagic schooling fish such as herring, sprat and sandeel (Dierschke *et al*. 2017, Kleinschmidt *et al*. 2019).

775. During construction there is potential for these prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition, and increases in underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

776. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

777. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of red-throated diver are present off the Firth of Tay and along the inner Firth of Forth, it is concluded that any impacts will be temporary and localised during construction and decommissioning and not lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA red-throated diver population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

778. Although red-throated diver are rated has having high sensitivity to vessel disturbance, disturbance from vessels undertaking annual inspection surveys and involved in cable reburial and repairs will be substantially reduced in both spatial and temporal extent compared to activities during construction and operation.

779. Ports used for maintenance activities within the Marine Scheme are yet to be confirmed and will be determined as part of competitive tendering processes. It is possible that a single Operations and Maintenance (O&M) base would be utilised, such as the port at nearby Blyth, with vessel movements unlikely to be noticeable above baseline vessel activity.

780. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of red-throated diver are present off the Firth and Tay and along the inner Firth of Forth, it is concluded that there is no potential for any adverse effects on the Outer Firth of Forth and St Andrews Bay Complex SPA red-throated diver population due to vessel disturbance during operation and maintenance

CHANGES TO PREY AVAILABILITY

781. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance and increased SSC and deposition during repairs and reburial could affect red-throated diver survival and productivity for the reasons outlined in Section 2.2.6.

782. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of red-throated diver are present off the Firth and Tay and along the inner Firth of Forth, it is concluded that there is no potential for any adverse effects on the Outer Firth of Forth and St Andrews Bay Complex SPA red-throated diver population due to changes in prey availability.

IN-COMBINATION EFFECTS

783. As detailed above, any effects from the Marine Scheme alone on the Outer Firth of Forth and St Andrews Bay Complex SPA red-throated diver population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.9.9. Assessment of Effects on Slavonian Grebe

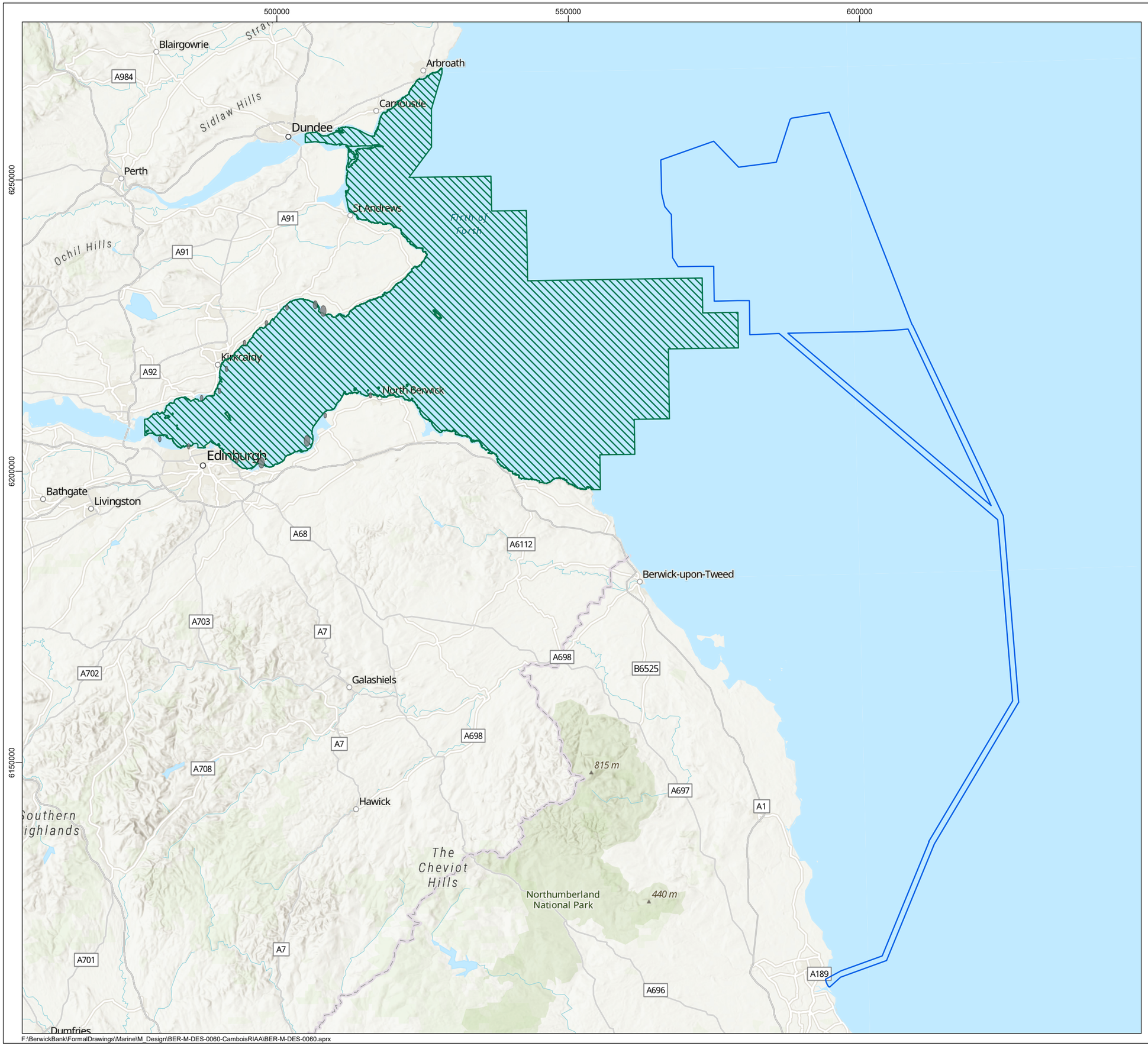
784. The distribution of Slavonian grebes within the Outer Firth of Forth and St Andrews Bay Complex SPA occur in both the major estuaries of the firths, but are more abundant in the Forth (NatureScot and JNCC 2022). The sheltered, inshore marine areas are used for foraging, roosting and maintenance

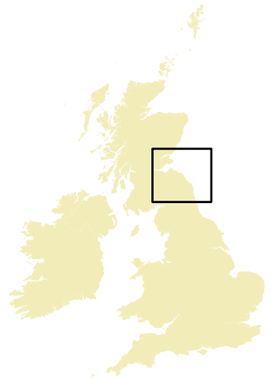
activities. They are present at the Outer Firth of Forth and St Andrews Bay Complex SPA from mid-September until late April (NatureScot and JNCC 2022).

785. The site reference population of 30 individuals has been calculated based on a multi-year programme of aerial, boat-based and land-based surveys (Lawson *et al*. 2015). WeBS data indicates that the peak mean population size has decreased since 2006 but has remained largely above the site reference populations (SSER, 2022b), reflected in the favourable condition of Slavonian grebe within the Outer Firth of Forth and St. Andrew's Bay Complex SPA.

786. Species-specific advice for Slavonian grebe is:

- *Maintain the population of non-breeding Slavonian grebe at a stable or increasing trend relative to the site reference population.*
- *Ensure Slavonian grebe continue to have access to, and can utilise all optimal habitats suitable for all relevant aspects of their life cycle associated with the site.*
- *Avoid significant disturbance to Slavonian grebe and ensure individuals can move safely between these areas within the site.*
- *Maintain the extent and distribution of the supporting habitats for Slavonian grebe within the site.*
- *Maintain the variety and abundance of food resources and the condition of supporting habitats and associated processes.*
- *Existing water quality should be maintained and any increase in nutrients, turbidity or contaminants where this could reduce supporting habitats and/or prey, should be avoided.*





Legend

- Marine Scheme Boundary
- Outer Firth of Forth and St. Andrew's Bay Complex SPA
- × 0
- 3 or less
- 3 - 7
- 7 or greater

Distribution of Slavonian grebe (10478)

Rev	Date	Status	Drwn	Chkd	Appd
04	-	-	-	-	-
03	-	-	-	-	-
02	-	-	-	-	-
01	17/05/2023	ISSUED FOR REVIEW	RB	AL	KC

sse Renewables

Berwick Bank Wind Farm

Project

BERWICK BANK WIND FARM

Title

FIGURE 8
DISTRIBUTION OF SLAVONIAN GREBE

0 5 10 20 nm
0 10 20 40 km
N

Scale	Plot Size	Datum	Projection
1:622,796	A3	WGS84	UTM30N

Drawing Number: BER-M-DES-0060-08

Sheet No.: 001 OF 001

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PROJECT ALONE: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

787. The Outer Firth of Forth and St Andrews Bay Complex SPA is located 2 km west of the Marine Scheme in Scottish waters at the closest point and 22 km west from the Marine Scheme in English Waters.

788. Slavonian grebes are considered as having a moderate to high sensitivity to vessel disturbance (Goodship and Furness 2022, Jarrett *et al*. 2022). However, given the distance between the Marine Scheme which lies entirely outwith the SPA, and known aggregations of Slavonian grebes off the Firth of Tay, and to a lesser degree also along the inner Firth of Forth, it is unlikely that significant numbers of Slavonian grebes use the area for foraging and/or roosting (Lawson *et al*. 2015, SNH 2015, SNH and JNCC 2016; Figure 8).

789. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

790. It is possible that a number of ports in the region may be utilised during construction and that vessels transiting to and from the Marine Scheme may pass through the Outer Firth of Forth and St. Andrew's Bay Complex SPA. However, given that the maximum number of vessels used during construction at any one time would be 20, and that not all vessels will be transiting at the same time, it is considered that vessel movements associated with the Marine Scheme are unlikely to be noticeable above baseline vessel activity in the region.

791. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

792. As outlined in Table 2-4, all vessels will adhere to the Scottish Marine Wildlife Watching Code and the Marine and Coastal Wildlife Code to further reduce any potential for vessel disturbance. Given the distance between the Marine Scheme and the main known aggregation of Slavonian grebe within the SPA, together with the limited number and extent of vessel movements associated with construction and decommissioning activities, it is considered that there is no potential for construction or decommissioning related vessel disturbance to lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA Slavonian grebe population.

CHANGES TO PREY AVAILABILITY

793. Slavonian grebe feed primarily on a range of small fish species (del Hoyo *et al*. 1996).

794. During construction there is potential for these prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition, and increases in underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

795. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to

be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

796. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of Slavonian grebes are present off the Firth and Tay and along the inner Firth of Forth, it is concluded that any impacts will be temporary and localised during construction and decommissioning and not lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA Slavonian grebe population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

797. Although Slavonian grebes are rated has having moderate-high sensitivity to vessel disturbance, disturbance from vessels undertaking annual inspection surveys and involved in cable reburial and repairs will be substantially reduced in both spatial and temporal extent compared to activities during construction and operation.

798. Ports used for maintenance activities within the Marine Scheme are yet to be confirmed and will be determined as part of competitive tendering processes. It is possible that a single Operations and Maintenance (O&M) base would be utilised, such as the port at nearby Blyth, with vessel movements unlikely to be noticeable above baseline vessel activity.

799. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of Slavonian grebes are present off the Firth and Tay and along the inner Firth of Forth, it is concluded that there is no potential for any adverse effects on the Outer Firth of Forth and St Andrews Bay Complex SPA Slavonian grebe population due to vessel disturbance during operation and maintenance.

CHANGES TO PREY AVAILABILITY

800. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance and increased SSC and deposition during repairs and reburial could affect Slavonian grebe survival and productivity for the reasons outlined in Section 2.2.6.

801. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of Slavonian grebes are present off the Firth of Tay and along the inner Firth of Forth, it is concluded that there is no potential for any adverse effects on the Outer Firth of Forth and St Andrews Bay Complex SPA Slavonian grebe population due to changes in prey availability.

IN-COMBINATION EFFECTS

802. As detailed above, any effects from the Marine Scheme alone on the Outer Firth of Forth and St Andrews Bay Complex SPA Slavonian grebe population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.9.10. Assessment of Effects on Kittiwake

803. Kittiwakes foraging in the Outer Firth of Forth and St Andrews Bay Complex SPA include those breeding at the Forth Islands SPA and St Abb's Head to Fast Castle SPA (NatureScot and JNCC

2022). Consequently, these SPA populations are considered functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA.

804. No site-reference population is set for kittiwake at the Outer Firth of Forth and St Andrews Bay Complex SPA due to the turnover of kittiwakes within the foraging area. For breeding kittiwake, when assessing plans or projects, the population impact should be considered in relation to the site reference populations for the above SPAs (NatureScot and JNCC 2022).

805. Species-specific advice in relation to kittiwake is to:

- *Ensure breeding kittiwake have the ability to recover at the relevant SPA breeding colonies.*
- *Ensure kittiwake within Outer Firth of Forth and St Andrews Bay Complex SPA are not at significant risk from injury or mortality during the breeding and non-breeding seasons.*
- *Ensure kittiwake can move safely between the site and important areas of functionally linked land outwith the site.*

806. Potential impacts from the Marine Scheme could arise from vessel disturbance and changes in prey availability during construction, operation and maintenance and decommissioning.

807. The potential impacts on kittiwake for each of the SPAs that are functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA have been assessed under each relevant SPA which have been screened into this RIAA. The conclusions for each assessment for the Marine Scheme alone and in-combination with other plans and projects are presented in Table 2.22 and apply to breeding and non-breeding populations across all phases of development.

Table 2-22: Potential for adverse effects on kittiwake from SPAs functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA.

SPA	Conclusion alone		Conclusion in-combination	
	Vessel disturbance	Changes in prey availability	Vessel disturbance	Changes in prey availability
Forth Islands	No adverse effect	No adverse effect	No adverse effect	No adverse effect
St Abb's Head to Fast Castle	No adverse effect	No adverse effect	No adverse effect	No adverse effect

808. On the basis that no potential for adverse effects has been identified on the Forth Islands SPA and St. Abb's Head to Fast Castle SPA kittiwake populations, which are functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA, it is concluded that there is no potential for an adverse effect on kittiwake at the Outer Firth of Forth and St Andrews Bay Complex SPA from the Marine Scheme alone or in-combination.

2.9.11. Assessment of Effects on Black-Headed Gull

809. Black-headed gulls are distributed throughout Scotland during the non-breeding season, primarily on the east and south-west coasts (Forrester *et al*., 2007). As well as birds arriving from elsewhere in the UK, many individuals migrate from northern and eastern Europe. Relatively large flocks of wintering black-headed gulls have been observed within the Outer Firth of Forth and St Andrews Bay Complex SPA at Skinflats and the Isle of May (Forrester *et al*., 2007).

810. The citation population of 26,835 individuals is based on winter gull surveys undertaken between 2003/04 and 2005/06 (NatureScot 2020) and based on the WeBS counts data the population has remained relatively stable since the last survey was undertaken (BTO 2022).

811. Species specific advice for black-headed gull is to:

- *Ensure black-headed gulls within Outer Firth of Forth and St Andrews Bay Complex SPA are not at significant risk from injury or mortality during the non-breeding season.*
- *Ensure black-headed gulls can move safely between the site and important areas of functionally linked land outwith the site.*

PROJECT ALONE: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

812. The Outer Firth of Forth and St Andrews Bay Complex SPA is located 2 km west of the Marine Scheme in Scottish waters at the closest point and 22 km west from the Marine Scheme in English Waters.

813. When using the marine environment (and not at the breeding colony), black-headed gulls are considered to have a relatively low sensitivity to such sources of direct disturbance. Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign black-headed gulls as '2' on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Furness *et al.* 2013).

814. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

815. It is possible that a number of ports in the region may be utilised during construction and that vessels transiting to and from the Marine Scheme may pass through the Outer Firth of Forth and St. Andrew's Bay Complex SPA. However, given that the maximum number of vessels used during construction at any one time would be 20, and that not all vessels will be transiting at the same time, it is considered that vessel movements associated with the Marine Scheme are unlikely to be noticeable above baseline vessel activity in the region.

816. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

817. As outlined in Table 2-4, all vessels will adhere to the Scottish Marine Wildlife Watching Code and the Marine and Coastal Wildlife Code to further reduce any potential for vessel disturbance.

818. There is potential for wintering black-headed gulls from the Outer Firth of Forth and St Andrews Bay Complex SPA to be presented in the Marine Scheme. However, given that black-headed gulls have low sensitivity to vessel disturbance together with the highly localised and temporary nature of the construction activities, the limited number of vessels that will be present on site at any one time and that vessels will move progressively along the entire Marine Scheme during the construction period, it is considered that there is no potential for construction or decommissioning related vessel disturbance to have an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA black-headed gull population.

CHANGES TO PREY AVAILABILITY

819. Given the highly localised and temporary nature of potential effects on prey species described in Section 2.2.5, together with the opportunistic feeding habits of black-headed gulls and thus the availability of alternative foraging habitat, it is considered that there is no potential for construction or

decommissioning related changes in prey availability to lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA black-headed gull population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

820. As described in in Section 2.2.5, vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time.

821. Given the low sensitivity of black headed gulls to disturbance effects at sea (Furness *et al*. 2013), the relatively small areas relative to the species range that will be subject intermittently to potentially disturbing activities, and the fact that these potential effects will be reduced compared to the construction and decommissioning phases, it is considered that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA black-headed gull population.

CHANGES TO PREY AVAILABILITY

822. Given the highly localised and temporary nature of potential effects on prey species described in Section 2.2.5, together with the opportunistic feeding habits of black-headed gulls and thus the availability of alternative foraging habitat, it is considered that there is no potential for operation and maintenance related changes in prey availability to lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA black-headed gull population.

IN-COMBINATION EFFECTS

823. As detailed above, any effects from the Marine Scheme alone on the Outer Firth of Forth and St Andrews Bay Complex SPA black-headed gull population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.9.12. Assessment of Effects on Little Gull

824. Little gull migrate to UK coastal environments for the non-breeding period. Post-breeding adult birds usually arrive in Scotland from Europe between late July and August, followed by juvenile birds, observed in the highest concentrations along the Angus and Dundee coast (Forrester *et al*., 2007). A secondary influx generally occurs between October and November, mainly consisting of adult and first-winter birds (Forrester *et al*., 2007).

825. The citation population of 126 individuals is based on winter gull surveys undertaken between 2001/02 and 2004/05 (NatureScot 2020) and based on WeBS counts data the population has fluctuated since 2001 (BTO 2022).

826. Species specific advice for little gull is to:

- *Maintain the extent and distribution of the supporting habitats for little gulls within the site.*
- *Maintain the condition of supporting habitats and associated processes.*
- *Existing water quality should be maintained and any increase in nutrients, turbidity or contaminants where this could reduce supporting habitats should be avoided.*

PROJECT ALONE: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

827. The Outer Firth of Forth and St Andrews Bay Complex SPA is located 2 km west of the Marine Scheme in Scottish waters at the closest point and 22 km west from the Marine Scheme in English Waters.

828. Reviews of the sensitivity of different seabird species to disturbance from vessels have not assessed little gull although generally gulls are considered not to be sensitive to vessel disturbance or (Furness *et al*. 2013).

829. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

830. It is possible that a number of ports in the region may be utilised during construction and that vessels transiting to and from the Marine Scheme may pass through the Outer Firth of Forth and St. Andrew's Bay Complex SPA. However, given that the maximum number of vessels used during construction at any one time would be 20, and that not all vessels will be transiting at the same time, it is considered that vessel movements associated with the Marine Scheme are unlikely to be noticeable above baseline vessel activity in the region.

831. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

832. As outlined in Table 2-4, all vessels will adhere to the Scottish Marine Wildlife Watching Code and the Marine and Coastal Wildlife Code to further reduce any potential for vessel disturbance.

833. There is potential for wintering little gulls from the Outer Firth of Forth and St Andrews Bay Complex SPA to be presented in the Marine Scheme. However, given that little gulls have low sensitivity to vessel disturbance together with the highly localised and temporary nature of the construction activities, the limited number of vessels that will be present on site at any one time and that vessels will move progressively along the entire Marine Scheme during the construction period (as described in Section 2.2.5), it is considered that there is no potential for construction or decommissioning related vessel disturbance to have an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA little gull population.

CHANGES TO PREY AVAILABILITY

834. Given the highly localised and temporary nature of potential effects on prey species described in Section 2.2.5, together with the highly opportunistic feeding habits of little gulls and thus the availability of alternative foraging habitat, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA little gull population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

835. As described in in Section 2.2.5, vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time.

836. Given the low sensitivity of little gull to disturbance effects at sea, the relatively small areas relative to the species range that will be subject intermittently to potentially disturbing activities, and the fact that these potential effects will be reduced compared to the construction and decommissioning phases, it is considered that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA little gull population.

CHANGES TO PREY AVAILABILITY

837. Given the highly localised and temporary nature of potential effects on prey species described in Section 2.2.5, together with the opportunistic feeding habits of little gull and thus the availability of alternative foraging habitat, it is considered that there is no potential for operation and maintenance related changes in prey availability to lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA little gull population.

IN-COMBINATION EFFECTS

838. As detailed above, any effects from the Marine Scheme alone on the Outer Firth of Forth and St Andrews Bay Complex SPA little gull population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.9.13. Assessment of Effects on Common Gull

839. Common gull is both a breeding and winter visitor to Scottish coastal waters. Generally, lower numbers of common gulls are present during the breeding period when they are breeding inland. During the non-breeding period they occur largely within inshore and coastal waters and are infrequent further offshore (Forrester *et al*. 2007).

840. The citation population of 14,647 individuals is based on winter gull surveys undertaken between 2003/04 and 2005/06 (NatureScot and JNCC 2022). Based on the WeBS counts data the population has remained relatively stable since 2001 (BTO 2022).

841. Species specific advice in relation to common gull is to:

- *Ensure common gull continue to have access to and can utilise all optimal habitats suitable for all relevant aspects of their life cycle associated with the site.*
- *Avoid significant disturbance to common gulls and ensure individuals can move safely between these areas within the site.*

THE POTENTIAL FOR IMPACTS ON THE COMMON GULL POPULATION

842. Potential impacts from the Marine Scheme could arise during construction, operation and maintenance and decommissioning and could cause changes in prey availability and disturbance

and displacement impacts. Consequently, the focus of the assessment for this SPA population is concerned with all the Conservation Objectives.

843. Common gulls were primarily recorded in the BBWF Offshore Ornithology Study Area during the non-breeding season in both years, with abundance peaking in December 2020 at 982 birds (95CI 232-1934). Project Alone: Construction and Decommissioning

VESSEL DISTURBANCE

844. The Outer Firth of Forth and St Andrews Bay Complex SPA is located 2 km west of the Marine Scheme in Scottish waters at the closest point and 22 km west from the Marine Scheme in English Waters.

845. Reviews of the sensitivity of different seabird species to disturbance from vessels have assessed common gull as having relatively low sensitivity from disturbance arising from vessels (Furness *et al*. 2013).

846. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

847. It is possible that a number of ports in the region may be utilised during construction and that vessels transiting to and from the Marine Scheme may pass through the Outer Firth of Forth and St. Andrew's Bay Complex SPA. However, given that the maximum number of vessels used during construction at any one time would be 20, and that not all vessels will be transiting at the same time, it is considered that vessel movements associated with the Marine Scheme are unlikely to be noticeable above baseline vessel activity in the region.

848. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

849. As outlined in Table 2-4, all vessels will adhere to the Scottish Marine Wildlife Watching Code and the Marine and Coastal Wildlife Code to further reduce any potential for vessel disturbance.

850. There is potential for wintering common gulls from the Outer Firth of Forth and St Andrews Bay Complex SPA to be presented in the Marine Scheme. However, given that common gulls have low sensitivity to vessel disturbance together with the highly localised and temporary nature of the construction activities, the limited number of vessels that will be present on site at any one time and that vessels will move progressively along the entire Marine Scheme during the construction period (as described in Section 2.2.5), it is considered that there is no potential for construction or decommissioning related vessel disturbance to have an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA common gull population.

CHANGES TO PREY AVAILABILITY

851. Common gulls are opportunistic feeders and therefore not restricted by prey availability. Given the highly localised and temporary nature of potential effects on prey species described in Section 2.2.5, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA common gull population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

852. As described in in Section 2.2.5, vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time.

853. Given the low sensitivity of common gull to disturbance effects at sea, the relatively small areas relative to the species range that will be subject intermittently to potentially disturbing activities, and the fact that these potential effects will be reduced compared to the construction and decommissioning phases, it is considered that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA common gull population.

CHANGES TO PREY AVAILABILITY

854. Given the highly localised and temporary nature of potential effects on prey species described in Section 2.2.5, together with the opportunistic feeding habits of common gull and thus the availability of alternative foraging habitat, it is considered that there is no potential for operation and maintenance related changes in prey availability to lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA common gull population.

IN-COMBINATION EFFECTS

855. As detailed above, any effects from the Marine Scheme alone on the Outer Firth of Forth and St Andrews Bay Complex SPA common gull population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.9.14. Assessment of Effects on Herring Gull

856. Herring gull foraging in the Outer Firth of Forth and St Andrews Bay Complex SPA include those breeding at the Forth Islands SPA and St Abb's Head to Fast Castle SPA (NatureScot and JNCC 2022). Consequently, these SPA populations are considered functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA.

857. No site-reference population is set for herring gull at the Outer Firth of Forth and St Andrews Bay Complex SPA due to the turnover of herring gulls within the foraging area. For breeding herring gull, when assessing plans or projects, the population impact should be considered in relation to the site reference populations for the above SPAs (NatureScot and JNCC 2022).

858. Species-specific advice for herring gull is to:

- *Ensure breeding herring have the ability to recover at the relevant SPA breeding colonies.*
- *Ensure herring gull within Outer Firth of Forth and St Andrews Bay Complex SPA are not at significant risk from injury or mortality during the breeding and non-breeding seasons.*
- *Ensure herring gull can move safely between the site and important areas of functionally linked land outwith the site.*

859. Potential impacts from the Marine Scheme could arise from vessel disturbance and changes in prey availability during construction, operation and maintenance and decommissioning.

860. The potential impacts on herring gull for each of the SPAs that are functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA have been assessed under each relevant SPA which have been screened into this RIAA. The conclusions for each assessment for the Marine Scheme alone and in-combination with other plans and projects are presented in Table 2.23 and apply to breeding and non-breeding populations across all phases of development.

Table 2-23: Potential for adverse effects on herring gull from SPAs functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA.

SPA	Conclusion alone		Conclusion in-combination	
	Vessel disturbance	Changes in prey availability	Vessel disturbance	Changes in prey availability
Forth Islands	No adverse effect	No adverse effect	No adverse effect	No adverse effect
St Abb's Head to Fast Castle	No adverse effect	No adverse effect	No adverse effect	No adverse effect

861. On the basis that no potential for adverse effects has been identified on the Forth Islands SPA and St. Abb's Head to Fast Castle SPA herring gull populations, which are functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA, it is concluded that there is no potential for an adverse effect on herring gull at the Outer Firth of Forth and St Andrews Bay Complex SPA from the Marine Scheme alone or in-combination.

2.9.15. Assessment of Effects on Arctic Tern

862. Arctic tern foraging in the Outer Firth of Forth and St Andrews Bay Complex SPA include those breeding at the Forth Islands SPA. Consequently, this SPA population is considered functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA.

863. No site-reference population is set for Arctic tern at the Outer Firth of Forth and St Andrews Bay Complex SPA due to the turnover of Arctic tern within the foraging area. For breeding Arctic tern, when assessing plans or projects, the population impact should be considered in relation to the site reference population for the Forth Islands SPA (NatureScot and JNCC 2022).

864. Site specific advice for Arctic tern is to:

- *Ensure Arctic terns within Outer Firth of Forth and St Andrews Bay Complex SPA are not at significant risk from injury or mortality during the breeding season.*
- *Ensure Arctic tern can move safely between the site and important areas of functionally linked land outwith the site.*

865. Potential impacts from the Marine Scheme could arise from vessel disturbance and changes in prey availability during construction, operation and maintenance and decommissioning.

866. The potential impacts on Arctic tern for have been assessed for the functionally-linked Forth Islands SPA. The conclusions for the Marine Scheme alone and in-combination with other plans and projects are presented in Table 2.24 and apply to breeding populations across all phases of development.

Table 2-24: Potential for adverse effects on Arctic tern from SPAs functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA.

SPA	Conclusion alone		Conclusion in-combination	
	Vessel disturbance	Changes in prey availability	Vessel disturbance	Changes in prey availability
Forth Islands	No adverse effect	No adverse effect	No adverse effect	No adverse effect

867. On the basis that no potential for adverse effects has been identified on the Forth Islands SPA Arctic tern population, which are functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA, it is concluded that there is no potential for an adverse effect on Arctic tern at the Outer Firth of Forth and St Andrews Bay Complex SPA from the Marine Scheme alone or in-combination.

2.9.16. Assessment of Effects on Common Tern

868. Common terns using the Outer Firth of Forth and St Andrews Bay Complex SPA include those breeding at the Forth Islands SPA. Consequently, this SPA population is considered functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA.

869. No site-reference population is set for common tern at the Outer Firth of Forth and St Andrews Bay Complex SPA due to the turnover of common terns within the foraging area. For breeding common tern, when assessing plans or projects, the population impact should be considered in relation to the site reference population for the Forth Islands SPA (NatureScot and JNCC 2022).

870. Species specific advice for comment tern is to:

- *Ensure breeding common tern have the ability to recover at the relevant SPA breeding colonies.*
- *Ensure common terns within Outer Firth of Forth and St Andrews Bay Complex SPA are not at significant risk from injury or mortality during the breeding season.*
- *Ensure common tern can move safely between the site and important areas of functionally linked land outwith the site.*

871. Potential impacts from the Marine Scheme could arise from vessel disturbance and changes in prey availability during construction, operation and maintenance and decommissioning.

872. The potential impacts on common tern for have been assessed for the functionally-linked Forth Islands SPA. The conclusions for the Marine Scheme alone and in-combination with other plans and projects are presented in Table 2.25 and apply to breeding populations across all phases of development.

Table 2-25: Potential for adverse effects on common tern from SPAs functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA.

SPA	Conclusion alone		Conclusion in-combination	
	Vessel disturbance	Changes in prey availability	Vessel disturbance	Changes in prey availability
Forth Islands	No connectivity	No connectivity	No connectivity	No connectivity

873. On the basis that no potential for adverse effects has been identified on the Forth Islands SPA common tern population, which are functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA, it is concluded that there is no potential for an adverse effect on common tern at the Outer Firth of Forth and St Andrews Bay Complex SPA from the Marine Scheme alone or in-combination.

2.9.17. Assessment of Effects on Guillemot

874. Guillemot foraging in the Outer Firth of Forth and St Andrews Bay Complex SPA include those breeding at Forth Islands SPA and St Abb's Head to Fast Castle SPA (NatureScot and JNCC 2022). Consequently, these SPA populations are considered functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA.

875. No site-reference population is set for guillemot at the Outer Firth of Forth and St Andrews Bay Complex SPA due to the turnover of guillemot within the foraging area. For breeding guillemot, when

assessing plans or projects, the population impact should be considered in relation to the site reference populations for the above SPAs (NatureScot and JNCC 2022).

876. Species specific advice in relation to guillemot is to:

- *Ensure guillemot within Outer Firth of Forth and St Andrews Bay Complex SPA are not at significant risk from injury or mortality during the breeding and non-breeding seasons.*
- *Ensure guillemot can move safely between the site and important areas of functionally linked land outwith the site.*

877. Potential impacts from the Marine Scheme could arise from vessel disturbance and changes in prey availability during construction, operation and maintenance and decommissioning.

878. The potential impacts on guillemot for each of the SPAs that are functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA have been assessed under each relevant SPA which have been screened into this RIAA. The conclusions for each assessment for the Marine Scheme alone and in-combination with other plans and projects are presented in Table 2.26 and apply to breeding and non-breeding populations across all phases of development.

Table 2-26: Potential for adverse effects on guillemot from SPAs functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA.

SPA	Conclusion alone		Conclusion in-combination	
	Vessel disturbance	Changes in prey availability	Vessel disturbance	Changes in prey availability
Forth Islands	No adverse effect	No adverse effect	No adverse effect	No adverse effect
St Abb's Head to Fast Castle	No adverse effect	No adverse effect	No adverse effect	No adverse effect

879. On the basis that no potential for adverse effects has been identified on the Forth Islands SPA and St. Abb's Head to Fast Castle SPA guillemot populations, which are functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA, it is concluded that there is no potential for an adverse effect on guillemot at the Outer Firth of Forth and St Andrews Bay Complex SPA from the Marine Scheme alone or in-combination.

2.9.18. Assessment of Effects on Razorbill

880. Non-breeding razorbill foraging in the Outer Firth of Forth and St Andrew's Bay Complex SPA include those from breeding populations at Forth Islands SPA and St Abb's Head to Fast Castle SPA (NatureScot and JNCC 2022). Consequently, these SPA populations are considered functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA.

881. No site-reference population is set for razorbill at the Outer Firth of Forth and St Andrews Bay Complex SPA in the non-breeding season and there are no SPAs that are functionally linked with razorbill (NatureScot and JNCC 2022).

882. Site specific advice in relation ro razorbill is to:

- *Ensure razorbill within Outer Firth of Forth and St Andrews Bay Complex SPA are not at significant risk from injury or mortality during the non-breeding season.*
- *Ensure razorbill can move safely between the site and important areas of functionally linked land outwith the site.*

883. Potential impacts from the Marine Scheme could arise from vessel disturbance and changes in prey availability during construction, operation and maintenance and decommissioning.

884. The potential impacts on razorbill for each of the SPAs that are functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA have been assessed under each relevant SPA which have been screened into this RIAA. The conclusions for each assessment for the Marine Scheme alone and in-combination with other plans and projects are presented Table 2.27 and apply to non-breeding populations across all phases of development.

Table 2-27: Potential for adverse effects on razorbill from SPAs functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA.

SPA	Conclusion alone		Conclusion in-combination	
	Vessel disturbance	Changes in prey availability	Vessel disturbance	Changes in prey availability
Forth Islands	No adverse effect	No adverse effect	No adverse effect	No adverse effect
St Abb's Head to Fast Castle	No adverse effect	No adverse effect	No adverse effect	No adverse effect

885. On the basis that no potential for adverse effects has been identified on the Forth Islands SPA and St. Abb's Head to Fast Castle SPA razorbill populations in the non-breeding season, which are functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA, it is concluded that there is no potential for an adverse effect on razorbill at the Outer Firth of Forth and St Andrews Bay Complex SPA from the Marine Scheme alone or in-combination.

2.9.19. Assessment of Effects on Puffin

886. Puffin using the Outer Firth of Forth and St Andrews Bay Complex SPA include those breeding at the Forth Islands SPA. Consequently, this SPA population is considered functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA.

887. No site-reference population is set for puffin at the Outer Firth of Forth and St Andrews Bay Complex SPA due to the turnover of puffin within the foraging area. For breeding puffin, when assessing plans or projects, the population impact should be considered in relation to the site reference populations for the Forth Islands SPA (NatureScot and JNCC 2022).

888. Site specific advice for puffin is to:

- *Ensure puffin within Outer Firth of Forth and St Andrews Bay Complex SPA are not at significant risk from injury or mortality during the breeding and non-breeding seasons.*
- *Ensure puffin can move safely between the site and important areas of functionally linked land outwith the site.*

889. Potential impacts from the Marine Scheme could arise from vessel disturbance and changes in prey availability during construction, operation and maintenance and decommissioning.

890. The potential impacts on puffin for Forth Islands SPA which is functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA have been assessed in this RIAA. The conclusions of this assessment for the Marine Scheme alone and in-combination with other plans and projects are presented in Table 2.28 and apply to breeding populations across all phases of development.

Table 2-28: Potential for adverse effects on puffin from SPAs functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA.

SPA	Conclusion alone		Conclusion in-combination	
	Vessel disturbance	Changes in prey availability	Vessel disturbance	Changes in prey availability
Forth Islands	No adverse effect	No adverse effect	No adverse effect	No adverse effect

891. On the basis that no potential for adverse effects has been identified on the Forth Islands SPA puffin population, which is functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA, it is concluded that there is no potential for an adverse effect on puffin at the Outer Firth of Forth and St Andrews Bay Complex SPA from the Marine Scheme alone or in-combination.

2.9.20. Assessment of Effects on Manx Shearwater

892. Manx shearwaters within the Outer Firth of Forth and St Andrews Bay Complex SPA may be a mixture of breeding birds from a mixture of colonies, sabbaticals, pre-breeding birds and possibly failed breeders.

893. Although there is no site reference population, the population at time of designation was 2,885 individuals (NatureScot 2020, NatureScot and JNCC 2022). There is currently insufficient information on Manx shearwater populations to assess a long-term UK trend, although indications from some of their main breeding colonies suggest an increasing trend (NatureScot and JNCC 2022).

894. Species specific advice for Manx shearwater is to:

- *Maintain the extent and distribution of the supporting habitats for little gulls within the site.*
- *Maintain the condition of supporting habitats and associated processes.*
- *Existing water quality should be maintained and any increase in nutrients, turbidity or contaminants where this could reduce supporting habitats should be avoided.*

PROJECT ALONE: CONSTRUCTION AND DECOMISSIONG

VESSEL DISTURBANCE

895. The Outer Firth of Forth and St Andrews Bay Complex SPA is located 2 km west of the Marine Scheme in Scottish waters at the closest point and 22 km west from the Marine Scheme in English Waters

896. Manx shearwater are highly mobile foragers that spend significant proportions of time in flight. Reviews of the sensitivity of different seabird species to disturbance from vessels have assessed Manx shearwater as having very low sensitivity from disturbance arising from vessels (Furness *et al*. 2013).

897. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

898. It is possible that a number of ports in the region may be utilised during construction and that vessels transiting to and from the Marine Scheme may pass through the Outer Firth of Forth and St. Andrew's Bay Complex SPA. However, given that the maximum number of vessels used during construction at any one time would be 20, and that not all vessels will be transiting at the same time, it is considered

that vessel movements associated with the Marine Scheme are unlikely to be noticeable above baseline vessel activity in the region.

899. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

900. As outlined in Table 2-4, all vessels will adhere to the Scottish Marine Wildlife Watching Code and the Marine and Coastal Wildlife Code to further reduce any potential for vessel disturbance.

901. There is potential for Manx shearwaters from the Outer Firth of Forth and St Andrews Bay Complex SPA to be presented in the Marine Scheme. However, given that Manx shearwaters have very low sensitivity to vessel disturbance together with the highly localised and temporary nature of the construction activities, the limited number of vessels that will be present on site at any one time and that vessels will move progressively along the entire Marine Scheme during the construction period (as described in Section 2.2.5), it is considered that there is no potential for construction or decommissioning related vessel disturbance to have an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA Manx shearwater population.

CHANGES TO PREY AVAILABILITY

902. Manx shearwater are opportunistic feeders and do not entirely rely on fish in their diet (Shoji *et al*. 2016). Given the highly localised and temporary nature of potential effects on prey species described in Section 2.2.5, together with the highly opportunistic feeding habits of Manx shearwater and thus the availability of alternative foraging habitat, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA Manx shearwater population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

903. As described in in Section 2.2.5, vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time.

904. Given the low sensitivity of Manx shearwater to disturbance effects at sea, the relatively small areas relative to the species range that will be subject intermittently to potentially disturbing activities, and the fact that these potential effects will be reduced compared to the construction and decommissioning phases, it is considered that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA Manx shearwater population.

CHANGES TO PREY AVAILABILITY

905. Given the highly localised and temporary nature of potential effects on prey species described in Section 2.2.5, together with the opportunistic feeding habits of Manx shearwater and thus the availability of alternative foraging habitat, it is considered that there is no potential for operation and maintenance related changes in prey availability to lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA Manx shearwater population.

IN-COMBINATION EFFECTS

906. As detailed above, any effects from the Marine Scheme alone on the Outer Firth of Forth and St Andrews Bay Complex SPA Manx shearwater population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.9.21. Assessment of Effects on Shag

907. Shags using the Outer Firth of Forth and St Andrews Bay Complex SPA include those breeding at the Forth Islands SPA. Consequently, the Forth Islands SPA population is considered functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA.

908. No site-reference population is set for shag at the Outer Firth of Forth and St Andrews Bay Complex SPA due to the turnover of shags within the foraging area. For breeding shag, when assessing plans or projects, the population impact should be considered in relation to the site reference populations for the above SPA (NatureScot and JNCC 2022).

909. Species-specific advice for shag is:

- *Maintain the population of non-breeding shag at a stable or increasing trend relative to the site reference population.*
- *Ensure shag continue to have access to, and can utilise all optimal habitats suitable for all relevant aspects of their life cycle associated with the site.*
- *Avoid significant disturbance to shag and ensure individuals can move safely between these areas within the site.*
- *Maintain the extent and distribution of the supporting habitats for shag within the site.*
- *Maintain the variety and abundance of food resources and the condition of supporting habitats and associated processes.*
- *Existing water quality should be maintained and any increase in nutrients, turbidity or contaminants where this could reduce supporting habitats and/or prey, should be avoided.*

PROJECT ALONE: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

910. The Outer Firth of Forth and St Andrews Bay Complex SPA is located 2 km west of the Marine Scheme in Scottish waters at the closest point and 22 km west from the Marine Scheme in English Waters.

911. Reviews of the sensitivity of different seabird species to disturbance from vessels have assessed shag as having a relative moderate sensitivity from disturbance arising from vessels (Furness *et al*. 2013). However, given the distance between the Marine Scheme which lies entirely outwith the SPA, and known aggregations of shags off the Isle of May and Fife coastline, it is unlikely that significant numbers of shags use the Marine Scheme for foraging (Lawson *et al*. 2015, SNH 2015, SNH and JNCC 2016).

912. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

913. It is possible that a number of ports in the region may be utilised during construction and that vessels transiting to and from the Marine Scheme may pass through the Outer Firth of Forth and St. Andrew's Bay Complex SPA. However, given that the maximum number of vessels used during construction at any one time would be 20, and that not all vessels will be transiting at the same time, it is considered that vessel movements associated with the Marine Scheme are unlikely to be noticeable above baseline vessel activity in the region.

914. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

915. As outlined in Table 2-4, all vessels will adhere to the Scottish Marine Wildlife Watching Code and the Marine and Coastal Wildlife Code to further reduce any potential for vessel disturbance. Therefore, it is considered that there is no potential for construction or decommissioning related vessel disturbance to lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA shag population.

CHANGES TO PREY AVAILABILITY

916. Shag prey on a wide variety of fish species in particular sandeels (Wanless *et al* 1997) but are adaptable and opportunistic taking a broad range of prey items (Swan *et al.* 2008, Hillersøy and Lorentsen 2012).

917. During construction there is potential for these prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition, and increases in underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of prey species (Volume 2 Chapter 9 Fish and Shellfish Ecology).

918. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

919. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of shag are present off the Isle of May and Fife coastlines, it is concluded that any impacts will be temporary and localised during construction and decommissioning and not lead to an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA shag population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

920. Although shags are rated has having moderate sensitivity to vessel disturbance, disturbance from vessels undertaking annual inspection surveys and involved in cable reburial and repairs will be substantially reduced in both spatial and temporal extent compared to activities during construction and operation.

921. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of shags are present off the Isle of May and Fife coastlines, it is concluded that there is no potential for any adverse effects on the Outer Firth of Forth and St Andrews Bay Complex SPA shag population due to vessel disturbance during operation and maintenance.

CHANGES TO PREY AVAILABILITY

922. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance and increased SSC and deposition during repairs and reburial could affect shag survival and productivity for the reasons outlined in Section 2.2.6.

923. Given that the Marine Scheme lies entirely outwith the SPA and that the main known aggregations of shag are present off the Isle of May and Fife coastline, it is concluded that there is no potential for any adverse effects on the Outer Firth of Forth and St Andrews Bay Complex SPA shag population due to changes in prey availability..

IN-COMBINATION EFFECTS

924. As detailed above, any effects from the Marine Scheme alone on the Outer Firth of Forth and St Andrews Bay Complex SPA shag population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.9.22. Assessment of Effects on Gannet

925. Gannets foraging in the Outer Firth of Forth and St Andrews Bay Complex SPA include those breeding at the Forth Islands SPA. Consequently, this SPA population is considered functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA.

926. No site-reference population is set for gannet at the Outer Firth of Forth and St Andrews Bay Complex SPA due to the turnover of gannet within the foraging area. For breeding gannet, when assessing plans or projects, the population impact should be considered in relation to the site reference populations for the Forth Islands SPA (NatureScot and JNCC 2022).

927. Species specific advice for gannet is to:

- *Ensure gannet within Outer Firth of Forth and St Andrews Bay Complex SPA are not at significant risk from injury or mortality during the breeding and non-breeding seasons.*
- *Ensure gannet can move safely between the site and important areas of functionally linked land outwith the site.*

928. Potential impacts from the Marine Scheme could arise from vessel disturbance and changes in prey availability during construction, operation and maintenance and decommissioning.

929. The potential impacts on gannet at Forth Islands SPA have been assessed separately. The conclusions for this assessment for the Marine Scheme alone and in-combination with other plans and projects are presented in Table 2-29**:** **Potential for adverse effects on gannet from SPAs functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA.** and apply to breeding populations across all phases of development.

Table 2-29: Potential for adverse effects on gannet from SPAs functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA.

SPA	Conclusion alone		Conclusion in-combination	
	Vessel disturbance	Changes in prey availability	Vessel disturbance	Changes in prey availability
Forth Islands	No adverse effect	No adverse effect	No adverse effect	No adverse effect

930. On the basis that no potential for adverse effects has been identified on the Forth Islands SPA gannet population, which is functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA, it is concluded that there is no potential for an adverse effect on gannet at the Outer Firth of Forth and St Andrews Bay Complex SPA from the Marine Scheme alone or in-combination.

2.9.23. Assessment of Effects on the Non-Breeding Waterfowl Assemblage

931. The Outer Firth of Forth and St Andrews Bay Complex SPA also qualifies by supporting in excess of 20,000 individual non-breeding waterbirds. Eider, velvet scoter, common scoter, goldeneye, red-breasted merganser and long-tailed duck are amongst the species identified in the citation as having nationally important populations which contribute to SPA non-breeding waterbird assemblage.

932. Potential impacts of the Marine Scheme alone and in-combination on the non-breeding waterfowl assemblage for the SPA could arise via effects on the individual species within the assemblage feature.

933. The assessment undertaken for each qualifying feature identifies no potential adverse effects on any of the component species from the project alone or in-combination. Consequently, it is concluded that there will not be an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA non-breeding waterfowl assemblage, in relation to the Marine Scheme alone or in-combination with other plans and projects.

2.9.24. Assessment of Effects on the Breeding Seabird Assemblage

934. The breeding seabird assemblage for the Outer Firth of Forth and St Andrews Bay Complex SPA is a qualifying feature on the basis of the SPA supporting in excess of 20,000 individual seabirds. Puffin, kittiwake, Manx shearwater, guillemot and herring gull are species identified in the citation as having nationally important populations which contribute to the Outer Firth of Forth and St Andrews Bay Complex SPA breeding seabird assemblage.

935. Potential impacts of the Marine Scheme alone and in-combination on the breeding seabird assemblage for the SPA could arise via effects on the individual species within the assemblage feature.

936. The assessment undertaken for each qualifying feature identifies no potential adverse effects on any of the component species from the project alone or in-combination. Consequently, it is concluded that there will not be an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA breeding seabird assemblage, in relation to the Marine Scheme alone or in-combination with other plans and projects.

2.9.25. Assessment of Effects on the Non-Breeding Seabird Assemblage

937. The non-breeding seabird assemblage for the Outer Firth of Forth and St Andrews Bay Complex SPA is a qualifying feature on the basis of the SPA supporting in excess of 20,000 individual seabirds. Black-headed, common and herring gulls, along with kittiwake, guillemot, razorbill and shag are the species identified in the citation as having nationally important populations which contribute to SPA non-breeding seabird assemblage.

938. Potential impacts of the Marine Scheme alone and in-combination on the non-breeding seabird assemblage for the SPA could arise via effects on the individual species within the assemblage feature.

939. The assessment undertaken for each qualifying feature identifies no potential adverse effects on any of the component species from the project alone or in-combination. Consequently, it is concluded that there will not be an adverse effect on the Outer Firth of Forth and St Andrews Bay Complex SPA non-

breeding seabird assemblage, in relation to the Marine Scheme either alone or in-combination with other plans and projects.

2.9.26. Site Conclusion

940. It is concluded that there is no potential for an adverse effect on the qualifying features of Outer Firth of Forth and St Andrews Bay Complex SPA due to the effects from the Marine Scheme alone or in-combination with other plans and projects. Consequently, it is concluded that there is no potential for an Adverse Effects on Integrity of the Outer Firth of Forth and St Andrews Bay Complex SPA.

2.10. Assessment of AEOSI: Forth Islands SPA

2.10.1. European Site Information and Conservation Objectives

941. The Forth Islands SPA is located approximately 38 km west of the Marine Scheme in Scottish waters and 70 km west of the Marine Scheme in English Waters (Figure 2 of Part One of the RIAA). This assessment is applicable to the Marine Scheme in both Scottish waters and English waters.

942. The Forth Islands SPA comprises seabird colonies on multiple islands in the Firth of Forth, southeast Scotland. The Isle of May is the closest of the islands within the SPA to the Marine Scheme, with the other islands in the SPA being Inchmickery, Fidra, The Lamb, Craigleith, Bass Rock (all of which were classified in April 1990) and Long Craig (which was an extension to the site and was classified in February 2004). The SPA is underpinned by the following Sites of Special Scientific Interest (SSSIs): Long Craig, Inchmickery, Forth Islands, Bass Rock and the Isle of May. There is a seaward extension from each island of the SPA extending approximately 2 km into the marine environment.

943. There are four Annex I qualifying features and the site qualifies under Article 4.2 by regularly supporting four migratory seabird species and in excess of 20,000 breeding seabirds, including five named component species (Table 5.42). As outlined in section 4, NatureScot's consultation response to Stage 1 HRA Screening advised that Forth Island's SPA should be screened in for further assessment. For the BBWF RIAA (BBWFL, 2022) no LSE was identified in relation to four of these 13 species, given that there was no overlap between their mean-maximum (plus 1 SD) foraging ranges and the Proposed Development. The Marine Scheme also lies outwith these species mean maximum (plus 1 SD) foraging ranges. Therefore, for the purposes of this RIAA, the same nine species as assessed in the BBWF RIAA will also be assessed with the effect pathways associated with LSE for each of these detailed in Table 2.2 and set out in the assessment below.

944. The conservation objectives of this SPA (as determined from NatureScot's SiteLink (SiteLink (nature.scot)) are:

- *To avoid deterioration of the habitats of the qualifying species (listed below) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and*
- *To ensure for the qualifying species that the following are maintained in the long term:*
  - *Population of the species as a viable component of the site;*
  - *Distribution of the species within site;*
  - *Distribution and extent of habitats supporting the species;*
  - *Structure, function and supporting processes of habitats supporting the species; and*
  - *No significant disturbance of the species.*

Table2-30: Details on the qualifying features of the Forth Islands SPA

Qualifying Feature	Season	Site Condition	Citation Population Size	Potential LSE
Seabird assemblage	Breeding	Favourable declining	90,000 individuals	Yes
Kittiwake*	Breeding	Unfavourable declining	8,400 pairs	Yes
Herring gull*	Breeding	Favourable maintained	6,600 pairs	Yes
Lesser black-backed gull	Breeding	Favourable maintained	1,500 pairs	Yes
Sandwich tern	Breeding	Unfavourable declining	440 pairs	No
Roseate tern	Breeding	Unfavourable declining	8 pairs	No
Common tern	Breeding	Unfavourable declining	334 pairs	Yes
Arctic tern	Breeding	Favourable declining	540 pairs	Yes
Guillemot*	Breeding	Favourable maintained	16,000 pairs	Yes
Razorbill*	Breeding	Favourable maintained	1,400 pairs	Yes
Puffin	Breeding	Favourable declining	14,000 pairs	Yes

Qualifying Feature	Season	Site Condition	Citation Population Size	Potential LSE
Gannet	Breeding	Favourable maintained	21,600 pairs	Yes
Cormorant*	Breeding	Unfavourable declining	200 pairs	No
Shag	Breeding	Unfavourable declining	2,400 pairs	No

*Named components of the assemblage only.

2.10.2. Assessment of Effects on Gannet

945. The largest gannet colony in the world occurs on Bass Rock, in the Forth Islands SPA (Murray *et al.* 2014). Gannet populations, including on the Bass Rock, increased substantially through the 20th and 21st centuries, with expansion at existing colonies and the development of new colonies occurring (Mitchell *et al.* 2004, Murray *et al*. 2015). There have been indications that the colony on Bass Rock is close to carrying capacity, with substantive increases having occurred over the last few decades beyond the citation population size.

946. The Marine Scheme does not overlap with the Forth Islands SPA, so that potential impacts on its gannet population will only occur as a result of individuals from the colony occurring in the area (or vicinity) of the Marine Scheme.

947. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

948. Forth Islands SPA is located 38 km west of the Marine Scheme in Scottish waters at the closest point and 70 km west of the Marine Scheme in English Waters at the closest point. Given that gannet has a mean maximum (plus 1 SD) breeding season foraging range of 509.4 km (Table 2-5 Breeding season foraging ranges for relevant SPA qualifying seabird species (Woodward *et al.,* 2019)) it is highly likely that gannet will be present along all sections of the Marine Scheme during the breeding season. Therefore, there is potential for the gannet feature of the Forth Islands SPA to be affected by disturbance associated with vessels and associated construction activities.

949. During the autumn and spring passage periods, the potential for effects of construction-related disturbance is lower than during the breeding season because the SPA gannets are essentially transiting through the waters within which the Marine Scheme is located.

950. When using the marine environment (and not at the breeding colony), gannets are considered to have a relatively low sensitivity to such sources of direct disturbance. Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign gannet as '2' on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al.* 2013).

951. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

952. The potential for disturbance effects during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

953. Given that gannet have low sensitivity to vessel disturbance together with the highly localised and temporary nature of the construction activities, the limited number of vessels that will be present on site at any one time and that vessels will move progressively along the entire Marine Scheme during the construction period, it is considered that there is no potential for construction or decommissioning related vessel disturbance to have an adverse effect on the Forth Islands SPA gannet population.

CHANGES TO PREY AVAILABILITY

954. Gannets predominantly prey upon fish including herring, mackerel, sprat and sandeel, as well as fishery discards (del Hoyo *et al*., 1996). Indirect effects on gannets may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Forth Islands SPA gannet population in the short-term.

955. During construction there is potential for prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (Volume 2 Chapter 9 Fish and Shellfish Ecology).

956. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

957. Given the highly localised and temporary nature of potential effects on prey species described above and in Section 2.2.5, together with the availability of alternative foraging habitat, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Forth Islands SPA gannet population

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

958. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the 35-year lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

959. Given the low sensitivity of gannet to disturbance effects at sea (Garthe and Hüppop 2004; Furness *et al*. 2013), the relatively small areas relative to the species' foraging range that will be subject intermittently to potentially disturbing activities (Woodward *et al*. 2019), and the fact that these potential effects will be reduced compared to the construction and decommissioning phases, it is considered that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Forth Islands SPA gannet population.

CHANGES TO PREY AVAILABILITY

960. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures could affect gannet survival and productivity in the Forth Islands SPA population.

961. Where additional cable protection is required along the Marine Scheme, this will result in permanent subtidal habitat loss. However, as discussed in Section 2.2.6, given the limited presence of key foraging, nursey and spawning grounds for key prey species along all sections of the Marine Scheme (English and Scottish), there is no potential for any adverse effects on the Forth Islands SPA gannet populations due to a reduction in prey availability.

962. Once the Marine Scheme is operational, there is potential for EMF and thermal emissions, although as discussed in Section 2.2.6 these effects are highly localised and are not predicted to have adverse effects on the availability of prey species.

963. There is also potential for underwater noise from geophysical surveys and temporary habitat loss and increased SSC during cable repairs and reburials. However, activities associated with cable repairs and reburials would be substantially less than during construction and decommissioning and are not predicted to adversely affect prey species.

964. Cable protection measures provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels. Whilst there is mounting evidence of potential benefits of artificial structures in the main environment (Birchenough and Degrae 2020), the statistical significance of such benefits and details about trophic interactions, particularly for seabirds, remain largely unknown (Peschko *et al*., 2020; BOWL 2021a, 2021b; Scott, 2022). Overall, any change in prey abundance and/or distribution through the presence of cable protection measures is likely to be very small relative to the area over which SPA gannets forage.

965. It is therefore considered that there is no potential for the Forth Islands SPA gannet population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Forth Islands SPA gannet population.

IN-COMBINATION EFFECTS

966. As detailed above, any effects from the Marine Scheme alone on the Forth Islands SPA gannet population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.10.3. Assessment of Effects on Kittiwake

967. The Forth Islands SPA kittiwake population is distributed across several islands in the Firth of Forth. The largest colony occurs on the Isle of May, with smaller colonies on Craigleith, Bass Rock, Fidra and The Lamb. The Isle of May colony holds approximately 75% of the total SPA population. The kittiwake population has declined in number since the SPA was designated, with the SPA counts being below the citation population size in all but two years since the mid-1980s. Counts from 2013 provide a tentative indication of some stabilisation in the SPA population size, albeit at a level well below the citation size.

968. The Marine Scheme does not overlap with the Forth Islands SPA, so that potential impacts on its kittiwake population will only occur as a result of individuals from the colony occurring in the area (or vicinity) of the Marine Scheme.

969. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

970. Forth Islands SPA is located 38 km west of the Marine Scheme in Scottish waters at the closest point and 70 km west of the Marine Scheme in English Waters at the closest point. Given that kittiwake has a mean maximum (plus 1 SD) breeding season foraging range of 300.6 km (Table 2-5 Breeding season foraging ranges for relevant SPA qualifying seabird species (Woodward *et al.,* 2019)) it is highly likely that kittiwake will be present along all sections of the Marine Scheme during the breeding season. Therefore, there is potential for the kittiwake feature of the Forth Islands SPA to be affected by disturbance associated with vessels and associated construction activities.

971. Indeed, tracking data (and associated modelling of foraging distributions) for kittiwake show that the Marine Scheme overlaps with, or occurs close to, waters that are used by birds from the Forth Islands SPA during the breeding season (Cleasby *et al.* 2018, Bogdanova *et al.* 2022). However, the degree of overlap is limited and excludes those areas of heaviest usage.

972. During the non-breeding periods, kittiwake distribution is not constrained by the location of the breeding colonies and birds from the SPA population are likely to occur across large expanses of oceanic and maritime waters (Frederiksen *et al.* 2012, Furness 2015) and the potential for effects of construction-related disturbance is lower than during the breeding season.

973. When using the marine environment (and not at the breeding colony), kittiwakes are considered to have a relatively low sensitivity to such sources of direct disturbance. Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign kittiwake as '2' on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al.* 2013).

974. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

975. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

976. Tracking data indicates that kittiwake from the St. Abb's Head to Fast Castle SPA will be present along the section of the Marine Scheme located in Scottish Waters and potentially in English Waters. However, given the low sensitivity of kittiwakes to vessel disturbance, the relatively small areas that will be subject to activities with the potential to result in disturbance at any given time during the construction period and the fact that these potential effects will be temporary, it is considered that there is no potential for construction or decommissioning related disturbance or displacement to lead to an adverse effect on the Forth Islands SPA kittiwake population.

CHANGES TO PREY AVAILABILITY

977. Key prey species for kittiwakes include sandeel and sprat (del Hoyo *et al*., 1996). Indirect effects on kittiwakes may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Forth Islands SPA kittiwake population in the short-term.

978. During construction there is potential for prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

979. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

980. Given the highly localised and temporary nature of potential effects on prey species described above and in Section 2.2.5, together with the availability of alternative foraging habitat, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Forth Islands SPA kittiwake population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

981. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the 35-year lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

982. Given the low sensitivity of kittiwake to disturbance effects at sea (Garthe and Hüppop 2004; Furness *et al*. 2013), the relatively small areas relative to the species' foraging range that will be subject intermittently to potentially disturbing activities (Woodward *et al*. 2019), and the fact that these potential effects will be reduced compared to the construction and decommissioning phases, it is considered that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Forth Islands SPA kittiwake population.

CHANGES TO PREY AVAILABILITY

983. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect kittiwake survival and productivity in the Forth Islands SPA kittiwake population.

984. Where additional cable protection is required along the Marine Scheme, this will result in permanent subtidal habitat loss. However, as discussed in Section 2.2.6, given the limited presence of key foraging, nursey and spawning grounds for key prey species along all sections of the Marine Scheme

(English and Scottish), there is no potential for any adverse effects on the Forth Islands SPA kittiwake populations due to a reduction in prey availability.

985. Once the Marine Scheme is operational, there is potential for EMF and thermal emissions, although as discussed in Section 2.2.6 these effects are highly localised and are not predicted to have adverse effects on the availability of prey species.

986. There is also potential for underwater noise from geophysical surveys and temporary habitat loss and increased SSC during cable repairs and reburials. However, activities associated with cable repairs and reburials would be substantially less than during construction and decommissioning and are not predicted to adversely affect prey species.

987. Cable protection measures provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels. Whilst there is mounting evidence of potential benefits of artificial structures in the main environment (Birchenough and Degrae 2020), the statistical significance of such benefits and details about trophic interactions, particularly for seabirds, remain largely unknown (Peschko *et al*., 2020; BOWL 2021a, 2021b; Scott, 2022). Overall, any change in prey abundance and/or distribution through the presence of cable protection measures is likely to be very small relative to the area over which SPA kittiwakes forage.

988. It is therefore considered that there is relatively little potential for the Forth Islands SPA kittiwake population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Forth Islands SPA kittiwake population...

IN-COMBINATION EFFECTS

989. As detailed above, any effects from the Marine Scheme alone on the Forth Islands SPA kittiwake population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.10.4. Assessment of Effects on Herring Gull

990. The Forth Islands SPA herring gull population is currently estimated to number 5,934 breeding pairs, which is slightly below the citation population of 6,600 pairs. The available count data for the population suggest that it has remained relatively stable and close to the citation size since the late 1980s at least.

991. The Marine Scheme does not overlap with the Forth Islands SPA, so that potential impacts on its herring gull population will only occur as a result of individuals from the colony occurring in the area (or vicinity) of the Marine Scheme.

992. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

993. Forth Islands SPA is located 38 km west of the Marine Scheme in Scottish waters at the closest point and 70 km west of the Marine Scheme in English Waters at the closest point. Given that herring gull has a mean maximum (plus 1 SD) foraging range of 85.6 km (Table 2-5 Breeding season foraging

ranges for relevant SPA qualifying seabird species (Woodward *et al.,* 2019)) it is likely that herring gull will be present along all sections of the Marine Scheme during the breeding season.

994. However, herring gull is considered to be relative insensitive to such disturbance effects (Garthe and Hüppop 2004, Furness *et al.* 2013), and a conclusion of no LSE was reached in relation to disturbance and displacement for the BBWF HRA Stage One Screening Report (BBWFL, 2021).

995. On this basis it can be concluded that there is no potential for construction or decommissioning related vessel disturbance to have an adverse effect on the Forth Islands SPA herring gull population.

CHANGES TO PREY AVAILABILITY

996. Herring gulls have a highly opportunistic diet (del Hoyo *et al*., 1996), utilising terrestrial, intertidal and marine habitats to forage for a wide variety of prey species including invertebrates, small fish and carrion (including fishery discards). Indirect effects on herring gulls may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Forth Islands SPA herring gull population in the short-term.

997. During construction there is potential for prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

998. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

999. Given their wide-ranging foraging behaviour and plasticity in foraging habitat and diet (del Hoyo *et al*., 1996), together with any effects being intermittent, spatially-restricted and temporary in nature, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Forth Islands SPA herring gull population.).

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

1000. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to inspection surveys and potential geophysical surveys (to check the Offshore Export Cables for any evidence of exposure or occurrence of freespans) and any cable repair or reburial works as outlined in Table 2-3 MDS specific to the assessment .

1001. Herring gull is considered to be relative insensitive to disturbance away from the breeding colony (Garthe and Hüppop 2004, Furness *et al.* 2013), and a conclusion of no LSE was reached in relation to disturbance and displacement for the BBWF HRA Stage One Screening Report (BBWFL, 2021). On this basis it is considered that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Forth Islands SPA herring gull population.

CHANGES TO PREY AVAILABILITY

1002. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation

of subsea structures, could affect herring gull survival and productivity in the Forth Islands SPA herring gull population.

1003. However, herring gull has flexible foraging habits and a highly opportunistic diet (del Hoyo *et al*., 1996), which enables them to forage for a wide variety of prey species including invertebrates, small fish and carrion (including fishery discards).

1004. It is therefore considered that there is relatively little potential for the Forth Islands SPA herring gull population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Forth Islands SPA herring gull population.

IN-COMBINATION EFFECTS

1005. As detailed above, any effects from the Marine Scheme alone on the Forth Islands SPA herring gull population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.10.5. Assessment of Effects on Lesser Black-Backed Gull

1006. The Forth Islands SPA lesser black-backed gull population is currently estimated to number 2,003 breeding pairs, which is above the citation population of 1,500 pairs. Based on those years for which full count data are available for the SPA, numbers have remained above the citation level since designation and appear relatively stable (albeit with indications of some fluctuations).

1007. The Marine Scheme does not overlap with the Forth Islands SPA, so that potential impacts on its lesser black-backed gull population will only occur as a result of individuals from the colony occurring in the area (or vicinity) of the Marine Scheme.

1008. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself

PROJECT ALONE: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

1009. Forth Islands SPA is located 38 km west of the Marine Scheme in Scottish waters at the closest point and 70 km west of the Marine Scheme in English Waters at the closest point. Given that lesser black-backed gull has a mean maximum (plus 1 SD) foraging range of 236 km (Table 2-5 Breeding season foraging ranges for relevant SPA qualifying seabird species (Woodward *et al.,* 2019)) it is likely that lesser black-backed gull will be present along all sections of the Marine Scheme during the breeding season.

1010. However, lesser black-backed is considered to be relative insensitive to such disturbance effects (Garthe and Hüppop 2004, Furness *et al.* 2013), and a conclusion of no LSE was reached in relation to disturbance and displacement for the BBWF HRA Stage One Screening Report (BBWF, 2021).

1011. On this basis it can be concluded that there is no potential for construction or decommissioning related vessel disturbance to have an adverse effect on the Forth Islands SPA lesser black-backed gull population.

CHANGES TO PREY AVAILABILITY

1012. Lesser black-backed gulls have a highly opportunistic diet (del Hoyo *et al*., 1996), utilising terrestrial, intertidal and marine habitats to forage for a wide variety of prey species including invertebrates, small fish and carrion (including fishery discards). Indirect effects on lesser black-backed gulls may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Forth Islands SPA lesser black-backed gull population in the short-term.

1013. During construction there is potential for prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

1014. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

1015. Given their wide-ranging foraging behaviour and plasticity in foraging habitat and diet (del Hoyo *et al*., 1996), together with any effects being intermittent, spatially-restricted and temporary in nature, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Forth Islands SPA lesser black-backed gull population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

1016. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to inspection surveys and potential geophysical surveys (to check the Offshore Export Cables for any evidence of exposure or occurrence of freespans) and any cable repair or reburial works as outlined in Table 2-3 MDS specific to the assessment .

1017. Lesser black-backed gull is considered to be relative insensitive to disturbance away from the breeding colony (Garthe and Hüppop 2004, Furness *et al.* 2013), and a conclusion of no LSE was reached in relation to disturbance and displacement for the BBWF HRA Stage One Screening Report (BBWFL, 2021). On this basis it is considered that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Forth Islands SPA lesser black-backed gull population.

CHANGES TO PREY AVAILABILITY

1018. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures could affect lesser black-backed gull survival and productivity in the Forth Islands SPA population.

1019. However, given their wide-ranging foraging behaviour and plasticity in foraging habitat and diet (del Hoyo *et al*., 1996), together with any effects on prey during operation and maintenance being largely intermittent across a relatively small spatial extent, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Forth Islands SPA lesser black-backed gull population.

IN-COMBINATION EFFECTS

1020. As detailed above, any effects from the Marine Scheme alone on the Forth Islands SPA lesser black-backed gull population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.10.6. Assessment of Effects on Common Tern

1021. The Forth Islands SPA common tern population is largely restricted to the Isle of May, with few pairs occurring elsewhere in SPA and with the most recent count data available on the Seabird Monitoring Programme Database (Seabird Monitoring Programme | JNCC (bto.org)) giving an estimate of 30 Apparently Occupied Nests (AON) for 2017 - 2019. This represents a marked decline from the citation population size of 334 breeding pairs, which was determined for the period from 1997 – 2001. The SPA population is considered to be in 'unfavourable declining' condition.

1022. Forth Islands SPA is located 38 km west of the Marine Scheme in Scottish waters at the closest point and 70 km west of the Marine Scheme in English Waters at the closest point. Given that common tern has a mean maximum (plus 1 SD) breeding season foraging range of 26.9 km (Table 2-5 Breeding season foraging ranges for relevant SPA qualifying seabird species (Woodward *et al.,* 2019)) it is highly unlikely that common terns from the Forth Islands SPA will be present along any section of the Marine Scheme during the breeding season.

1023. It is therefore concluded that no further assessment of the common tern feature of the Forth Islands SPA is required.

2.10.7. Assessment of Effects on Arctic Tern

1024. The Forth Islands SPA Arctic tern population occurs on the Isle of May, with the most recent count data available on the Seabird Monitoring Programme Database (Seabird Monitoring Programme | JNCC (bto.org)) giving an estimate of 832 pairs in 2017. This is higher than the citation population size of 540 breeding pairs but represents a decline from previous counts (e.g. 908 pairs were estimated in 2000). The SPA population is considered to be in 'favourable declining' condition.

1025. The Marine Scheme does not overlap with the Forth Islands SPA, so that potential impacts on its Arctic tern population will only occur as a result of individuals from the colony occurring in the area (or vicinity) of the Marine Scheme.

1026. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

1027. Forth Islands SPA is located 38 km west of the Marine Scheme in Scottish waters at the closest point and 70 km west of the Marine Scheme in English waters at the closest point. Given that Arctic tern has a mean maximum (plus 1 SD) breeding season foraging range of 40.5 km (Table 2-5 Breeding season foraging ranges for relevant SPA qualifying seabird species (Woodward *et al.,* 2019)), it is unlikely that Arctic terns from the Forth Islands SPA will occur within the Marine Scheme to any extent during the breeding period. This is because the Marine Scheme is 41 km from the Isle of May (where the Arctic tern colony is located) at its closest point, which is just beyond the mean maximum breeding

season foraging range plus 1 SD for Arctic tern (i.e. 40.5 km – Woodward *et al.* 2019). This would suggest that there is little, or no, potential for the connectivity with the Marine Scheme.

1028. Furthermore, when using the marine environment (and not at the breeding colony), Arctic terns are considered to have a relatively low sensitivity to vessel disturbance. Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign Arctic tern as '2' on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al.* 2013).

1029. As set out in the MDS (Table 2-3 MDS specific to the assessment) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

1030. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

1031. Given the likely lack of connectivity between the Marine Scheme and breeding Arctic terns at the Forth Islands SPA, together with their low sensitivity to vessel disturbance, the relatively small areas that will be subject to activities with the potential to result in disturbance at any given time during the construction period and the fact that these potential effects will be temporary, it is considered that there is no potential for construction or decommissioning related disturbance or displacement to lead to an adverse effect on the Forth Islands SPA Arctic tern population.

CHANGES TO PREY AVAILABILITY

1032. During construction there is potential for Arctic tern prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (ES Volume 2 Chapter Fish and Shellfish Ecology).

1033. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

1034. Given the highly localised and temporary nature of potential effects on prey species described above and in Section 2.2.5, together with the likely lack of connectivity between the Marine Scheme and the Arctic terns breeding at the Forth Islands SPA, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Forth Islands SPA Arctic tern population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

1035. Given the lack of likely connectivity between the Marine Scheme and Arctic terns breeding at the Forth Islands SPA, together with the low sensitivity of Arctic tern to disturbance effects at sea (Garthe and Hüppop 2004; Furness *et al*. 2013), and the fact that potential effects will be reduced compared to the

construction and decommissioning phases, it is considered that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Forth Islands SPA Arctic tern population.

CHANGES TO PREY AVAILABILITY

1036. Key prey species for Arctic terns include small forage fish such as sandeel (del Hoyo *et al*., 1996). Indirect effects on Arctic terns may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Forth Islands SPA Arctic tern population in the short-term.

1037. Given the limited potential for connectivity between the Marine Scheme and the potential foraging range of breeding Arctic terns from the Forth Islands SPA, together with any effects being intermittent, spatially-restricted and temporary in nature, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Forth Islands SPA Arctic tern population.

IN-COMBINATION EFFECTS

1038. As detailed above, any effects from the Marine Scheme alone on the Forth Islands SPA Arctic tern population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.10.8. Assessment of Effects on Guillemot

1039. The Forth Islands SPA guillemot population occurs on several islands in the Firth of Forth. The largest colony occurs on the Isle of May, with smaller colonies on Craigleith, Bass Rock, Fidra and The Lamb. The Isle of May colony represents approximately 68% of the SPA total. The guillemot population size in the SPA declined during the early to late 2000's, but has shown limited signs of recovery in more recent years and remains close to the citation population size of 32,000 breeding adult birds.

1040. The Marine Scheme does not overlap with the Forth Islands SPA, so that potential impacts on its guillemot population will only occur as a result of individuals from the colony occurring in the area (or vicinity) of the Marine Scheme.

1041. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

1042. Forth Islands SPA is located 38 km west of the Marine Scheme in Scottish waters at the closest point and 70 km west of the Marine Scheme in English Waters at the closest point. Based on the mean maximum foraging range (plus 1 SD) for guillemot of 153.7 km (Woodward *et al*. 2019), there is potential for guillemot from the Forth Islands SPA to be present along the entire Marine Scheme in both English and Scottish Waters.

1043. Tracking data (and associated modelling of foraging distributions) for guillemot suggest that the Marine Scheme has little overlap with waters that are heavily used by birds from the Forth Islands SPA during the breeding season (Cleasby *et al.* 2018, Bogdanova *et al.* 2022).

1044. During the non-breeding period guillemot distribution is less constrained by the location of the breeding colonies but for the purposes of the current assessment, it is assumed that the area occupied by the SPA population is defined by the mean maximum breeding season foraging range plus 1 SD following Buckingham *et al.* (2022). Thus, the potential for effects of construction-related disturbance is assumed to be similar to that during the breeding season.

1045. When using the marine environment (and not at the breeding colony), guillemots are considered to have a moderate sensitivity to such sources of direct disturbance. Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign guillemot as '3' on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al.* 2013).

1046. As set out in the MDS (Table 2-3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

1047. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

1048. Although guillemot has moderate sensitivity to disturbance effects, given the highly localised and temporary nature of the construction activities, the limited number of vessels that will be present on site at any one time and that vessels will move progressively along the entire Marine Scheme during the construction period, it is considered that there is no potential for construction or decommissioning related vessel disturbance or displacement to lead to an adverse effect on the Forth Islands SPA guillemot population.

CHANGES TO PREY AVAILABILITY

1049. Sandeels are key prey for guillemots, with a range of other species taken including clupeids (sprat and juvenile herring; del Hoyo *et al*., 1996). Indirect effects on guillemots may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Forth Islands SPA guillemot population in the short-term.

1050. During construction there is potential for prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (ES Volume 2 Chapter 9 Fish and Shellfish Ecology).

1051. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

1052. Given the highly localised and temporary nature of potential effects on prey species described above and in Section 2.2.5, together with the availability of alternative foraging habitat, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Forth Islands SPA guillemot population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

1053. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the 35-year lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

1054. Although guillemot is rated has having moderate sensitivity to vessel disturbance, disturbance from vessels undertaking annual inspection surveys and involved in cable reburial and repairs will be substantially reduced in both spatial and temporal extent compared to activities during construction and operation. It is therefore considered that that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Forth Islands SPA guillemot population.

CHANGES TO PREY AVAILABILITY

1055. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect survival and productivity in the Forth Islands SPA guillemot population for the reasons outlined in Section 2.2.6.

1056. Where additional cable protection is required along the Marine Scheme, this will result in permanent subtidal habitat loss. However, as discussed in Section 2.2.6, given the limited presence of key foraging, nursey and spawning grounds for key prey species along all sections of the Marine Scheme (English and Scottish), there is no potential for any adverse effects on the Forth Islands SPA guillemot population due to a reduction in prey availability.

1057. Once the Marine Scheme is operational, there is potential for EMF and thermal emissions, although as discussed in Section 2.2.6 these effects are highly localised and are not predicted to have adverse effects on the availability of prey species.

1058. There is also potential for underwater noise from geophysical surveys and temporary habitat loss and increased SSC during cable repairs and reburials. However, activities associated with cable repairs and reburials would be substantially less than during construction and decommissioning and are not predicted to adversely affect prey species.

1059. Cable protection measures provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels, although overall any change in prey abundance and/or distribution through the presence of cable protection measures is likely to be very small relative to the area over which SPA guillemots forage.

1060. It is therefore considered that there is relatively little potential for the Forth Islands SPA guillemot population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently,

it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Forth Islands SPA guillemot population.

IN-COMBINATION EFFECTS

1061. As detailed above, any effects from the Marine Scheme alone on the Forth Islands SPA guillemot population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.10.9. Assessment of Effects on Razorbill

1062. The Forth Islands SPA razorbill population occurs on several islands in the Firth of Forth. The largest colony occurs on the Isle of May, with smaller colonies on Craigleith, Bass Rock, Fidra and The Lamb. The Isle of May colony represents approximately 90% of the total SPA population. The razorbill population size in the SPA has increased since 1985, and despite a period of decline in the mid 2000's there has been sustained increases since 2013, with the population size being considerably higher than the citation level.

1063. The Marine Scheme does not overlap with the Forth Islands SPA, so that potential impacts on its guillemot population will only occur as a result of individuals from the colony occurring in the area (or vicinity) of the Marine Scheme.

1064. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

1065. Forth Islands SPA is located 38 km west of the Marine Scheme in Scottish waters at the closest point and 70 km west of the Marine Scheme in English Waters at the closest point. Based on the mean maximum foraging range (plus 1 SD) for razorbill of 164.6 km (Woodward *et al*. 2019), there is potential for razorbill from the Forth Islands SPA to be present along the entire Marine Scheme in both English and Scottish Waters.

1066. Tracking data (and associated modelling of foraging distributions) for razorbill suggest that the Marine Scheme has little overlap with waters that are heavily used by birds from the Forth Islands SPA during the breeding season (Cleasby *et al.* 2018, Bogdanova *et al.* 2022).

1067. During the non-breeding periods, razorbill distribution is not constrained by the location of the breeding colonies and birds from the SPA population are likely to occur across large parts of the North Sea (Furness 2015, Buckingham *et al.* 2022) so that the potential for effects of construction-related disturbance is lower than during the breeding season.

1068. When using the marine environment (and not at the breeding colony), razorbills are considered to have a moderate sensitivity to such sources of direct disturbance. Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign razorbill as '3' on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al.* 2013).

1069. As set out in the MDS (Table 2.3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

1070. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

1071. Although razorbill has moderate sensitivity to disturbance effects, given the highly localised and temporary nature of the construction activities, the limited number of vessels that will be present on site at any one time and that vessels will move progressively along the entire Marine Scheme during the construction period, it is considered that there is no potential for construction or decommissioning related vessel disturbance or displacement to lead to an adverse effect on the Forth Islands SPA razorbill population.

CHANGES TO PREY AVAILABILITY

1072. Sandeels are key prey for razorbills, with a range of other species taken including sprat and juvenile herring (del Hoyo *et al*., 1996). Indirect effects on razorbills may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Forth Islands SPA razorbill population in the short-term.

1073. During construction there is potential for prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (Volume 2 Chapter 9 Fish and Shellfish Ecology).

1074. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

1075. Given the highly localised and temporary nature of potential effects on prey species described above and in Section 2.2.5, together with the availability of alternative foraging habitat, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Forth Islands SPA razorbill population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

1076. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the 35-year lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in

cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

1077. Although razorbill is rated has having moderate sensitivity to vessel disturbance, disturbance from vessels undertaking annual inspection surveys and involved in cable reburial and repairs will be substantially reduced in both spatial and temporal extent compared to activities during construction and operation. It is therefore considered that that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Forth Islands SPA razorbill population.

CHANGES TO PREY AVAILABILITY

1078. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect survival and productivity in the Forth Islands SPA razorbill population for the reasons outlined in Section 2.2.6.

1079. Where additional cable protection is required along the Marine Scheme, this will result in permanent subtidal habitat loss. However, as discussed in Section 2.2.6, given the limited presence of key foraging, nursey and spawning grounds for key prey species along all sections of the Marine Scheme (English and Scottish), there is no potential for any adverse effects on the Forth Islands SPA razorbill population due to a reduction in prey availability.

1080. Once the Marine Scheme is operational, there is potential for EMF and thermal emissions, although as discussed in Section 2.2.6 these effects are highly localised and are not predicted to have adverse effects on the availability of prey species.

1081. There is also potential for underwater noise from geophysical surveys and temporary habitat loss and increased SSC during cable repairs and reburials. However, activities associated with cable repairs and reburials would be substantially less than during construction and decommissioning and are not predicted to adversely affect prey species.

1082. Cable protection measures provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels, although overall any change in prey abundance and/or distribution through the presence of cable protection measures is likely to be very small relative to the area over which SPA razorbills forage.

1083. It is therefore considered that there is relatively little potential for the Forth Islands SPA razorbill population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Forth Islands SPA razorbill population.

IN-COMBINATION EFFECTS

1084. As detailed above, any effects from the Marine Scheme alone on the Forth Islands SPA razorbill population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.10.10. Assessment of Effects on Puffin

1085. The Forth Islands SPA puffin population occurs on several islands in the Firth of Forth. The largest colony occurs on the Isle of May, with smaller colonies on Craigleith, Fidra, Inchmickery, and The

Lamb. The Isle of May colony represents approximately 89% of the total SPA population. The SPA puffin population is only counted sporadically and there are very few counts across all the colonies in the SPA in any one year. The Forth Islands SPA puffin population is considered to be in 'favourable declining' condition.

1086. The Marine Scheme does not overlap with the Forth Islands SPA, so that potential impacts on its guillemot population will only occur as a result of individuals from the colony occurring in the area (or vicinity) of the Marine Scheme.

1087. Consequently, the focus of the assessment for this SPA population is not concerned with the conservation objectives which relate to supporting habitats within the SPA itself.

PROJECT ALONE: CONSTRUCTION AND DECOMMISSIONING

VESSEL DISTURBANCE

1088. Forth Islands SPA is located 38 km west of the Marine Scheme in Scottish waters at the closest point and 70 km west of the Marine Scheme in English Waters at the closest point. Based on the mean maximum foraging range (plus 1 SD) for puffin of 265.4 km (Woodward *et al*. 2019), there is potential for razorbill from the Forth Islands SPA to be present along the entire Marine Scheme in both English and Scottish Waters.

1089. Tracking data for puffin from the Forth Islands SPA indicate that the Marine Scheme has little overlap with waters that are heavily used during the breeding season (Bogdanova *et al.* 2022).

1090. During the non-breeding periods, puffin migrate rapidly from their UK breeding areas dispersing widely across north-west European seas and the Atlantic (Wernham *et al*. 2002, Harris and Wanless 2011, Jessopp *et al* 2013), such that there is no potential for effects of construction-related disturbance.

1091. When using the marine environment (and not at the breeding colony), puffins are considered to have a relatively low sensitivity to such sources of direct disturbance. Thus, reviews of the sensitivity of different seabird species to disturbance from vessels assign puffin as '2' on a five-scale ranking system, where 1 indicates hardly any or limited escape/avoidance behaviour and very short flight distance when approached and 5 indicates strong escape/avoidance behaviour and a large response distance (Garthe and Hüppop 2004, Furness *et al.* 2013).

1092. As set out in the MDS (Table 2.3) and discussed in Section 2.2.5, it is expected that the entire Marine Scheme will take 39 months to completed, of which installation of the Offshore Export Cables will take 18 months and installation of the Offshore Export Cables using trenchless technology at the Landfall will take 15 months. The maximum number of vessels present within the 720 km long Marine Scheme at any one time would be 20. Vessel movements will be limited in spatial extent as they progressively move along the route of the Offshore Export Cables, limiting the total duration and number of vessels present in any specific location at any one time.

1093. The potential for vessel disturbance during decommissioning is assumed to be the same (or less) as for construction, noting that the duration of the decommissioning phase will not exceed that of construction, and may be shorter.

1094. Given the relatively low sensitivity of puffin to disturbance effects, the relatively small areas that will be subject to activities with the potential to result in disturbance at any given time during the construction period and the fact that these potential effects will be temporary, it is considered that there is no potential for construction or decommissioning related disturbance or displacement to lead to an adverse effect on the Forth Islands SPA puffin population.

CHANGES TO PREY AVAILABILITY

1095. Sandeels are key prey for puffins, with a range of other species taken including clupeids and gadids (del Hoyo *et al.*, 1996). Indirect effects on puffins may arise as a result of changes in the availability, distribution, or abundance of these species during the construction and decommissioning phases of the Marine Scheme. Reduction or disruption to prey availability may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity in the Forth Islands SPA puffin population in the short-term.

1096. During construction there is potential for prey species to be affected by temporary habitat loss/disturbance, increased SSC and sediment deposition and potential injury/disturbance from underwater noise and vibration. As outlined in Section 2.2.5, these effects are considered to be highly localised and of limited duration (temporary) with very limited potential for adversely affecting the availability of fish as seabird prey species (Volume 2 Chapter 9 Fish and Shellfish Ecology).

1097. During decommissioning, the effects from changes in prey availability are considered to be the same (or less) as for construction. However, some infrastructure (such as cable protection) is assumed to be left *in situ* with the impact of colonisation of infrastructure continuing in perpetuity following decommissioning.

1098. Given the highly localised and temporary nature of potential effects on prey species described above and in Section 2.2.5, together with the availability of alternative foraging habitat, it is considered that there is no potential for construction or decommissioning related changes in prey availability to lead to an adverse effect on the Forth Islands SPA puffin population.

PROJECT ALONE: OPERATION AND MAINTENANCE

VESSEL DISTURBANCE

1099. Vessel activity during the operation and maintenance of the Marine Scheme will be limited to annual inspection and geophysical surveys, and any cable repair or reburial works. Inspection and geophysical surveys will be similar to those completed pre-construction but expected to be limited to one vessel being present on site at any one time. Where repairs and reburials are required, this is likely to involve a construction vessel and guard vessels to be present. The MDS assumes up to four repairs and four reburials may be required over the 35-year lifetime of the Marine Scheme. These would only be required for short stretches of the cable route (1 km stretches). Activities involved in cable reburial and repairs will also be substantially reduced compared to activities during construction and operation.

1100. Given that puffin are considered to have low sensitivity to vessel disturbance, it is therefore considered that that there is no potential for vessel disturbance during operation and maintenance to lead to an adverse effect on the Forth Islands SPA puffin population.

CHANGES TO PREY AVAILABILITY

1101. Reduction or disruption to prey availability through temporary and long-term subtidal habitat loss/disturbance, increased SSC and deposition, EMF from subsea electrical cabling, and colonisation of subsea structures, could affect survival and productivity in the Forth Islands SPA puffin population for the reasons outlined in Section 2.2.6.

1102. Where additional cable protection is required along the Marine Scheme, this will result in permanent subtidal habitat loss. However, as discussed in Section 2.2.6, given the limited presence of key foraging, nursey and spawning grounds for key prey species along all sections of the Marine Scheme (English and Scottish), there is no potential for any adverse effects on the Forth Islands SPA puffin population due to a reduction in prey availability.

1103. Once the Marine Scheme is operational, there is potential for EMF and thermal emissions, although as discussed in Section 2.2.6 these effects are highly localised and are not predicted to have adverse effects on the availability of prey species.

1104. There is also potential for underwater noise from geophysical surveys and temporary habitat loss and increased SSC during cable repairs and reburials. However, activities associated with cable repairs and reburials would be substantially less than during construction and decommissioning and are not predicted to adversely affect prey species.

1105. Cable protection measures provide hard substrate for settlement of various organisms, which can increase local food availability for higher trophic levels, although overall any change in prey abundance and/or distribution through the presence of cable protection measures is likely to be very small relative to the area over which SPA puffins forage.

1106. It is therefore considered that there is relatively little potential for the Forth Islands SPA puffin population to be affected by changes to prey availability during the operation and maintenance phase, with any such effects being largely intermittent across a relatively small spatial extent. Consequently, it is considered that there is no potential for operational or maintenance related changes in prey availability to lead to an adverse effect on the Forth Islands SPA puffin population.

IN-COMBINATION EFFECTS

1107. As detailed above, any effects from the Marine Scheme alone on the Forth Islands SPA puffin population resulting from vessel disturbance and changes to prey availability across all phases of development will be highly localised and largely temporary. As such, there is considered to be no potential for these effect pathways to add to impacts at the population-level that might result from other effects pathways associated with the Marine Scheme or from the effects due to other plans and projects.

2.10.11. Assessment of Effects on the Breeding Seabird Assemblage

1108. The breeding seabird assemblage for the Forth Islands SPA is a qualifying feature on the basis of the SPA supporting in excess of 20,000 individual seabirds (with the citation also noting that, as at 1986 – 1988, the SPA regularly supported 90,000 seabirds). Razorbill, guillemot, kittiwake, herring gull, gannet, lesser black-backed gull, puffin, Arctic tern and common tern are amongst the species identified in the citation as having nationally important populations which contribute to the Forth Islands SPA breeding seabird assemblage.

1109. There is no potential for impacts from the Marine Scheme alone and in-combination with other plans or projects on the breeding seabird assemblage for the SPA to arise via effects on the individual species within the assemblage feature.

1110. Given the above, it is concluded that there is there is no potential for an adverse effect on the Forth Islands SPA breeding seabird assemblage, in relation to the Marine Scheme alone or in-combination with other plans and projects.

2.10.12. Site Conclusion

1111. It is concluded that there is no potential for an adverse effect on the qualifying features of the Forth Islands SPA due to the effects from the Marine Scheme alone or in-combination with other plans and projects. Consequently, it is concluded that there is no potential for an Adverse Effects on Integrity of the Forth Islands SPA.

3. Conclusions of the RIAA

3.1. SPAs

1112. HRA Screening identified eight SPAs and associated qualifying features where LSE could not be ruled out, these sites were taken forward for assessment.

1113. For Teesmouth and Cleveland Coast SPA/Ramsar Site the pathways for assessment included vessel disturbance (including nearshore activity) and changes in prey availability during construction, operation and maintenance, and decommissioning. A project alone and in-combination assessment was undertaken which concluded that there is no potential for an adverse effect on the qualifying features of the Teesmouth and Cleveland Coast SPA due to the effects from the Marine Scheme alone or in-combination with other plans and projects. Consequently, it is concluded that there is no potential for an Adverse Effects on Integrity of the Teesmouth and Cleveland Coast SPA.

1114. For Northumbria Coast SPA/Ramsar Site the pathways for assessment included vessel disturbance (including nearshore activity) and changes in prey availability during construction, operation and maintenance, and decommissioning as well as long term habitat loss during operation and maintenance. A project alone and in-combination assessment was undertaken which concluded that there is no potential for an adverse effect on the qualifying features of the Northumbria Coast SPA due to the effects from the Marine Scheme alone or in-combination with other plans and projects. Consequently, it is concluded that there is no potential for an Adverse Effects on Integrity of the Northumbria Coast SPA/Ramsar Site.

1115. For Northumberland Marine SPA the pathways for assessment included vessel disturbance (including nearshore activity) and changes in prey availability during construction, operation and maintenance, and decommissioning as well as long term habitat loss during operation and maintenance. A project alone and in-combination assessment was undertaken which concluded that there is no potential for an adverse effect on the qualifying features of the Northumberland Marine SPA due to the effects from the Marine Scheme alone or in-combination with other plans and projects. Consequently, it is concluded that there is no potential for an Adverse Effects on Integrity of the Northumberland Marine SPA.

1116. For Coquet Island SPA the pathways for assessment included vessel disturbance and changes in prey availability during construction, operation and maintenance, and decommissioning. A project alone and in-combination assessment was undertaken which concluded that there is no potential for an adverse effect on the qualifying features of the Coquet Island SPA due to the effects from the Marine Scheme alone or in-combination with other plans and projects. Consequently, it is concluded that there is no potential for an Adverse Effects on Integrity of the Coquet Island SPA.

1117. For Farne Islands SPA the pathways for assessment included vessel disturbance and changes in prey availability during construction, operation and maintenance, and decommissioning. A project alone and in-combination assessment was undertaken which concluded that there is no potential for an adverse effect on the qualifying features of the Farne Islands SPA due to the effects from the Marine Scheme alone or in-combination with other plans and projects. Consequently, it is concluded that there is no potential for an Adverse Effects on Integrity of the Farne Islands SPA.

1118. For St Abb's Head to Fast Castle SPA the pathways for assessment included vessel disturbance and changes in prey availability during construction, operation and maintenance, and decommissioning. A project alone and in-combination assessment was undertaken which concluded that there is no potential for an adverse effect on the qualifying features of the St Abb's Head to Fast Castle SPA due to the effects from the Marine Scheme alone or in-combination with

other plans and projects. Consequently, it is concluded that there is no potential for an Adverse Effects on Integrity of the St Abb's Head to Fast Castle SPA.

1119. For Outer Firth of Forth and St Andrews Bay Complex SPA the pathways for assessment included vessel disturbance and changes in prey availability during construction, operation and maintenance, and decommissioning. A project alone and in-combination assessment was undertaken which concluded that there is no potential for an adverse effect on the qualifying features of the Outer Firth of Forth and St Andrews Bay Complex SPA due to the effects from the Marine Scheme alone or in-combination with other plans and projects. Consequently, it is concluded that there is no potential for an Adverse Effects on Integrity of the St Abb's Outer Firth of Forth and St Andrews Bay Complex SPA.

1120. For Forth Islands SPA the pathways for assessment included vessel disturbance and changes in prey availability during construction, operation and maintenance, and decommissioning. A project alone and in-combination assessment was undertaken which concluded that there is no potential for an adverse effect on the qualifying features of the Forth Islands SPA due to the effects from the Marine Scheme alone or in-combination with other plans and projects. Consequently, it is concluded that there is no potential for an Adverse Effects on Integrity of the Forth Islands SPA.

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