Cambois Connection – Marine Scheme

Habitats Regulations Assessment/Appraisal: Report to Inform Appropriate Assessment: Part 1

sse Renewables

Revision Information

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Approval for Issue

Approver's name	SIGNATURE	DATE
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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.
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

Term	Description
	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 terms refers to the same network of sites defined under the Habitats Regulations.

Term	Description
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
BBWF	Berwick Bank Wind Farm
BBWFL	Berwick Bank Wind Farm Limited
CaP	Cable Protection
CBRA	Cable Burial Risk Assessment
CIEEM	Chartered Institue of Ecology and Environmental Management
CJEU	Court of Justice of the European Union
DDV	Drop Down Video
EC	European Commission
EGL	Eastern Green Link
EMF	Electromagnetic Field
EPS	European Protected Species
ES	Environmental Statement
EU	European Union
FCS	Favourable Conservation Status
GMF	Geomagnetic field
HDD	Horizontal Directional Drilling
HRA	Habitats Regulations Appraisal/Assessment
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IAMMWG	Inter Agency Marine Mammal Working Group
iE	Induced Electric
IROPI	Imperative Reasons of Overriding Public Interest
JNCC	Joint Nature Conservation Committee
LSE	Likely Significant Effects

Acronym	Description
MARPOL	International Convention for the Prevention of Pollution from Ships
MBES	Multi-Beam Echo Sounder
MCZ	Marine Conservation Zone
MDS	Maximum Design Scenario
MFE	Mass-Flow Excavator
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMMP	Marine Mammal Mitigation Protocol
MMO	Marine Management Organisation
MD-LOT	Marine Directorate – Licencing Operations Team
MPA	Marine Protected Area
MU	Management Unit
NM	Nautical mile
NCC	Northumberland County Council
NGESO	National Grid Electricity Systems Operator
NPF4	National Planning Framework 4
NSIP	Nationally Significant Infrastructure Project
OCT	Open Cut Trench
PINS	Planning Inspectorate
PLGR	Pre-Lay Grapnel Run
pSPA	Potential Special Protection Area
pSAC	Possible Special Area of Conservation
PTS	Permanent Threshold Shift
pUXO	Potential Unexploded Ordnance
RIAA	Report to inform Appropriate Assessment
ROV	Remotely Operated Vehicle
SAC	Special Area of Conservation

Acronym	Description
SBP	Sub-Bottom Profiling
SCI	Site of Community Importance
SCOS	Special Committee on Seals
SEGL	Scotland to England Green Link
SMU	Seal Management Units
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
TJB	Transition Joint Bay
TTS	Temporary Threshold Shift
UK	United Kingdom
UXO	Unexploded Ordnance
USBL	Ultra Short Base Line
ZOI	Zone of Influence

Units

Unit	Description
cm	Centimetres
dB	Decibel
Hz	Hertz
kJ	Kilojoules
kHz	Kilohertz
km	Kilometre (distance)
km^2	Kilometre squared
m	Metres
m/s	Metres per second

Unit	Description
m^2	Metre squared
nm	Nautical mile (distance)
µT	Microtesla
µPa	Micropascal
µV/m	Microvolts per metre
V/m	volts per metre

1. Introduction

1.1. Overview

1. In line with the United Kingdom (UK) statutory target to achieve net zero greenhouse gas emissions by the year 2050, Berwick Bank Wind Farm Limited (BBWFL) (hereafter referred to as 'the Applicant') is submitting applications for the development of Offshore Export Cables, Onshore Export Cables, an Onshore Converter Station and an associated grid connection at Cambois, Northumberland (hereafter referred to as the 'Cambois Connection' / 'the Project').

2. The purpose of the Project is to facilitate the export of green energy from the Berwick Bank Wind Farm (BBWF) (being determined separately[1]), located in the outer Firth of Forth, to the identified grid connection at Cambois, Northumberland.

3. The requirement for the Project is driven by the need to deliver the maximum generating capacity from the BBWF before 2030 The export of green energy from offshore renewable energy assets is critical for assisting the Scottish and United Kingdom's (UK) Governments in the achievement of net zero targets and the reduction of greenhouse gas emissions (as outlined in section 3).

4. The BBWF is a proposed offshore wind farm located in the outer Firth of Forth and Firth of Tay, approximately 37.8 km east of the Scottish Borders coastline (St. Abb's Head) and 47.6 km from the East Lothian coastline. BBWF comprises the offshore and onshore infrastructure required to generate and transmit electricity from the BBWF array area to a Scottish Power Energy Networks (SPEN) 400kV Grid Substation located at Branxton, southwest of Torness Power station.

5. In July 2022, National Grid Electricity Systems Operator (NGESO) announced as part of its Holistic Network Review, that the Applicant has signed an agreement for an additional grid connection at Blyth, Northumberland (referred to as the Cambois Connection); it is this connection which is the subject of this document.

6. The BBWF has been included as an in-combination project for the purposes of this Marine Scheme Report to Inform Appropriate Assessment (RIAA) and similarly, the Applicant assessed the Cambois Connection as part of their separate application for consent under Section 36 of the Electricity Act 1989.

7. The Project comprises two proposals, or 'Schemes' which are illustrated in Figure 1:

   - **Marine Scheme**: The Applicant is proposing the construction of High Voltage Direct Current (HVDC) Offshore Export Cables from within the BBWF array area in the outer Firth of Forth (Scotland) to a proposed Landfall at Cambois, Northumberland (England). Those aspects of the Project seaward of Mean High Water Springs (MHWS) are defined as part of the Marine Scheme.
   - **Onshore Scheme**: The Applicant is proposing the construction of a Cable Landfall, onshore HVDC cables, a new Onshore Converter Station, High Voltage Alternating Current (HVAC) cables from the new Onshore Converter Station to the existing Blyth National Grid substation near Cambois and works to integrate the Onshore Scheme into the National Grid at the existing substation. Those aspects of the Project onshore and extending down to the seaward-

[1] An application for consent under Section 36 of the Electricity Act 1989 (as amended) was submitted to MD-LOT in December 2022.

extent of the Landfall at Mean Low Water Springs (MLWS) are defined as part of the Onshore Scheme.

8. Respective Scoping Reports for the Marine Scheme and Onshore Scheme were submitted to both Marine Directorate Licensing Operations Team (MD-LOT) and the Marine Management Organisation (MMO), and Northumberland County Council (NCC), in November 2022 to support a request for a formal Scoping Opinion in relation to the Project (Berwick Bank Offshore Wind Farm Cambois Connection – Firth of Forth Marine Scheme Scoping Report (BBWFL, 2022a) and Berwick Bank Offshore Wind Farm Cambois Connection – Firth of Forth Onshore Scheme Scoping Report (BBWFL, 2022b).

9. A detailed description of the Marine Scheme is provided in section 2. The parameters outlined are considered the maximum design parameters for the Marine Scheme and therefore present a conservative, precautionary approach for the purpose of this RIAA.

1.2. Purpose of this RIAA

10. The RIAA has been prepared by Xodus Group Ltd (Xodus) and the Applicant to support the Habitats Regulations Appraisal/Assessment (HRA[2]) of the Marine Scheme in the determination of the implications for European Sites.

11. 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))[3]. 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.

12. 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).

13. 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).

14. 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.

[2] 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.

[3] 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.

1.3. Progress To Date

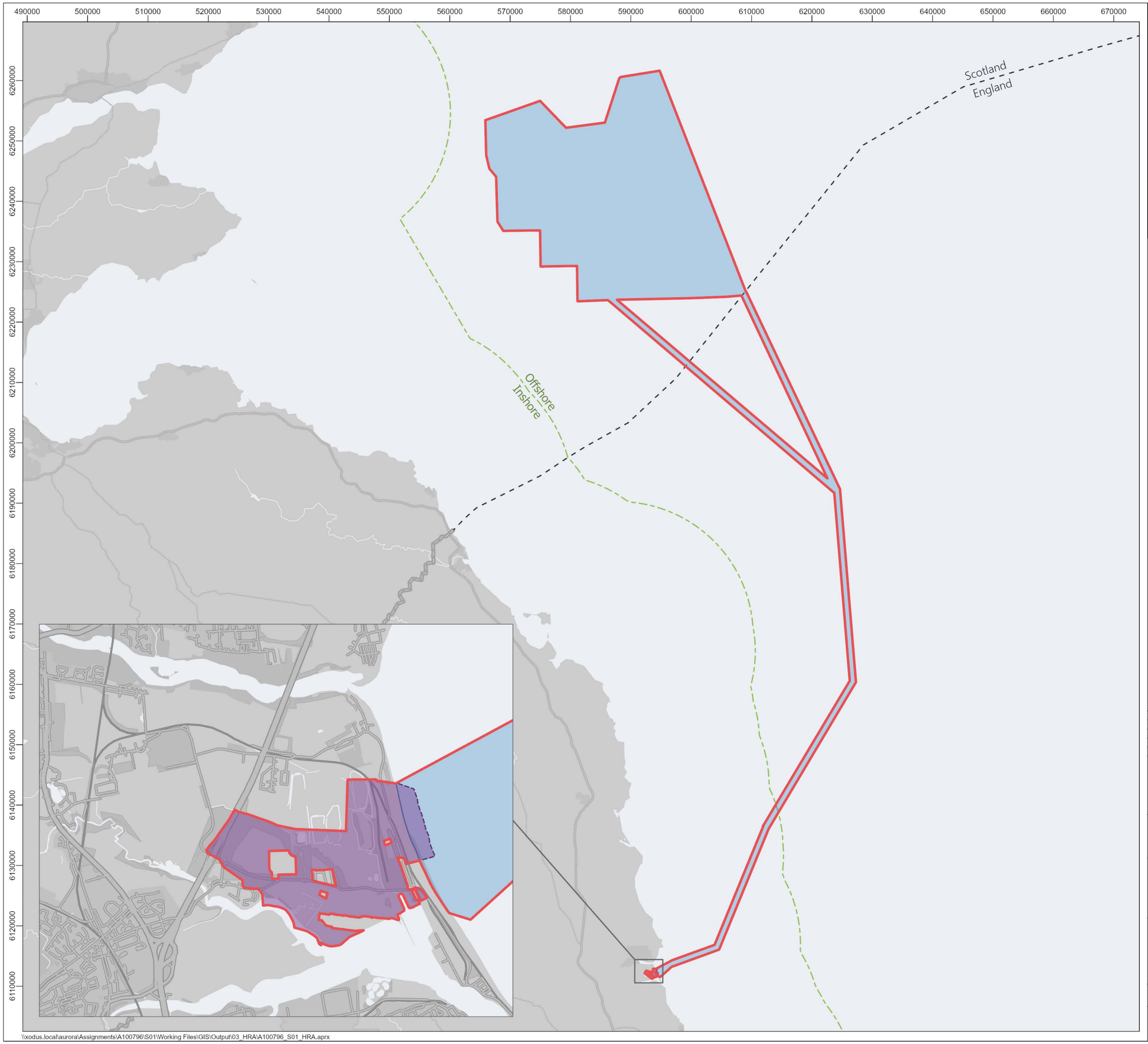
15. The RIAA has been informed by advice received in the Cambois Connection Scoping Opinions (MD-LOT, 2023; MMO, 2023), as well as the Stage One HRA Screening advice from NatureScot and Natural England (NatureScot 2023a and Natural England, 2023a).

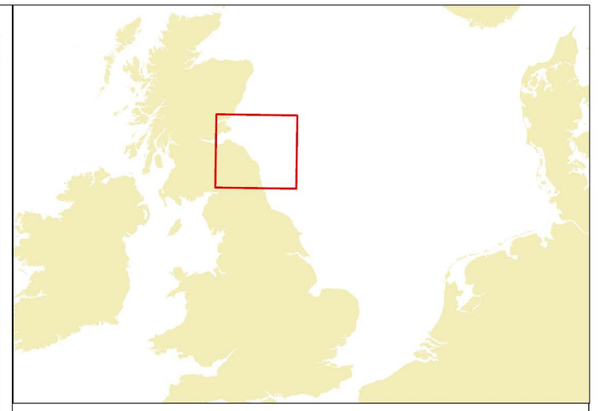
16. The Marine Scheme Environmental Statement (ES) (BBWFL, 2023b) and this RIAA will support the Marine Licence applications to the MD-LOT and the MMO under the Marine and Coastal Access Act 2009. The Onshore Scheme ES will support a Planning Application to NCC under Section 57 of the Town and Country Planning Act 1990.

17. Separate RIAA documents will be prepared for the Marine Scheme and the Onshore Scheme. This document contains the RIAA for the Marine Scheme which supports the HRA associated with the Marine Licence applications to MD-LOT and the MMO.

18. This report addresses Stage Two of the HRA process by assessing the implications of the Marine Scheme for European sites, in light of their conservation objectives, where LSEs could not be ruled out, to determine if the Marine Scheme will have any adverse effects on the site integrity of any of these sites. The RIAA as presented in this document will provide the competent authority with the information required to undertake an HRA Appropriate Assessment for the Marine Scheme.

19. HRA is an iterative process. Since the HRA Stage One Screening Report was shared with consultees, aspects of the Marine Scheme design have evolved and additional information is available, reflecting progress made by the Applicant to refine the Marine Scheme design; for full details, please refer to ES, Volume 2, Chapter 6: Route Appraisal and Consideration of Alternatives. A summary of the changes is presented in section 2.3. Design evolution of the Marine Scheme is not considered to have changed the conclusions of the HRA Stage One Screening Report and indeed has had the likely effect of *reducing* the potential for LSEs as a result of the Marine Scheme. By way of example, since the Scoping exercise and consultation on the HRA Stage One Screening Report, works at Landfall will adopt trenchless techniques, such as Horizontal Directional Drilling (HDD), and open cut trenching has been ruled out.





Legend

- Cambois Connection
- Onshore Scheme Boundary
- Marine Scheme Boundary
- UK 12 Nautical Mile Limit
- Scotland/England Territorial Waters

Rev	Date	Status	Drwn	Chkd	Appd
04	-	-	-	-	-
03	-	-	-	-	-
02	20/06/2023	Revised	TF	AMB	EW
01	22/03/2023	Issued	TF	JO	EW

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Project

Cambois Connection

Title

Figure 1 Location and Extent

0 2.5 5 10 15 20 nm

0 2.5 5 10 15 20 25 30 km

N

Scale	Plot Size	Datum	Projection
1:600,000	A3	WGS84	UTM30N

Drawing Number: A100796_S01_HRA_01

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1.4. Structure of the RIAA

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

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

1.5. Structure of this Document

21. This document constitutes Part One of the RIAA.

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

23. 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	Project Description
Section 3	Legislation and Policy
Section 4	Approach to the RIAA
Section 5	Information to Inform Appropriate Assessment (SACs)
Section 6	Conclusions of the RIAA (SACs)
Section 7	References (SACs)

2. Project Description

2.1. Overview

24. The Marine Scheme will support the transmission of green energy generated by the BBWF (located in Scottish waters) to the grid connection in England (Blyth substation) via subsea HVDC cables (Offshore Export Cables).

25. The Marine Scheme will involve the construction, operation and maintenance, and decommissioning of up to four subsea HVDC cables (Offshore Export Cables) from within the BBWF array area located in Scottish waters. The Offshore Export Cables will originate at up to two Offshore Converter Station Platforms (OSCPs) which will be located within the wider BBWF array area. From this point, the Offshore Export Cables will be installed along a route with a broad north-south alignment to the proposed Landfall location along the Cambois coastline, Northumberland, as presented in Figure 1.

2.1.1. Indicative Project Programme

26. An outline of the programme for construction of the Marine Scheme is given below to provide indicative commencement and completion dates, together with estimated durations of key construction activities.

27. Until detailed design of the Marine Scheme is progressed and further refined pre-construction, this programme for the Marine Scheme as a whole is indicative and is subject to further refinement but is used to inform assessment of construction phase impacts for the Marine Scheme.

28. The indicative outline construction programme includes the following:

- Commencement of offshore construction (including site preparation works) expected in Q4 2026;
- Commencement of construction at Landfall estimated in Q4 2027;
- Commencement of Offshore Export Cable installation estimated in Q3 2028;
- Completion of construction in Q4 2029; and
- Key construction activity and estimated durations:
    - Site preparation works: up to 39 months;
    - Landfall construction: up to 15 months; and
    - Offshore Export Cable installation: up to 18 months.

29. 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.

2.1.2. Project Design Envelope

30. The Project Design Envelope (PDE) approach (also known as the Rochdale Envelope approach) has been adopted for the assessment of the Marine Scheme. The PDE concept allows for some flexibility in project design options where the full details of a Project are not known at Application submission.

31. The PDE establishes a series of realistic design assumptions from which the Maximum Design Scenarios (MDS) are drawn for the Marine Scheme.

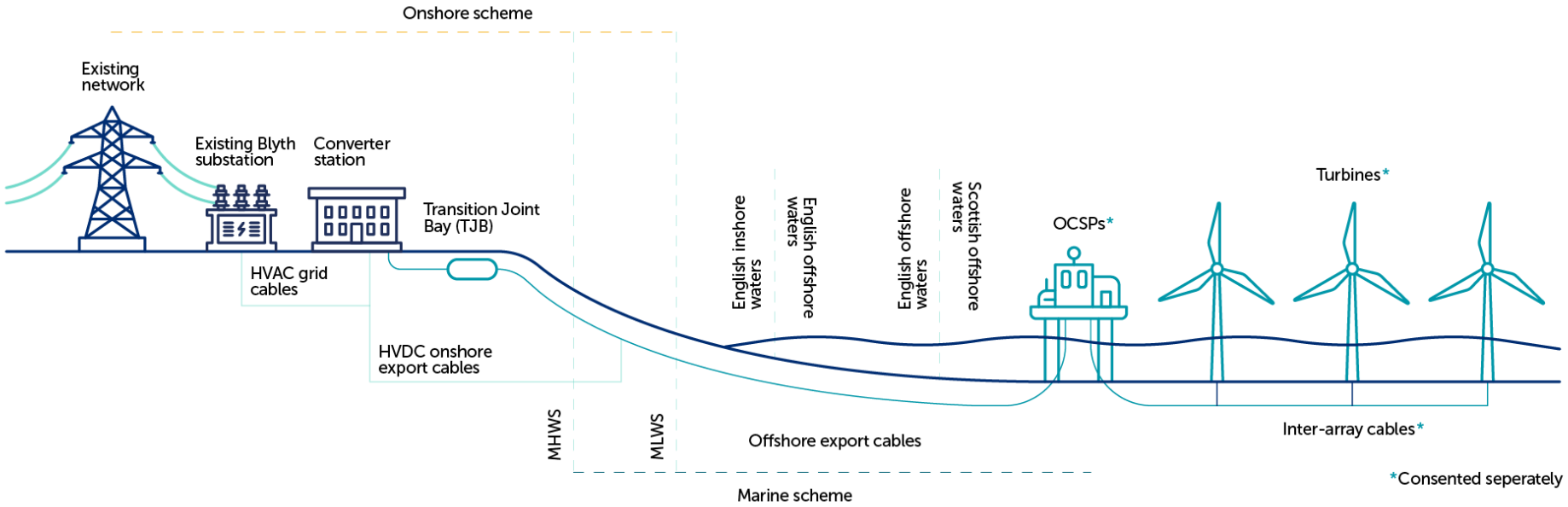


Plate 1 Cambois Connection Cross-Sectional Summary

32. The construction of the Offshore Export Cables for the Marine Scheme will include a range of activities including pre-installation surveys, seabed preparation and clearance, installation of Offshore Export Cables, construction of crossing infrastructure (where required), installation of cable protection where required and installation of the Offshore Export Cables using trenchless techniques where they make Landfall at Cambois, Northumberland.

33. Building on the information provided as part of the HRA Stage One Screening Report (BBWFL, 2023a, included as Appendix 1), key activities associated with the cable installation are summarised below followed by a summary of all parameters in section 2.2. To aid the review of this document by NatureScot / MD-LOT and Natural England / MMO in Scottish and English waters respectively, the relevance of each activity to geographies is provided in Table 2 below.

Table 2 Summary of activities in Scottish and English Waters

Activity	Scottish Waters	English Waters
Pre-Construction Surveys	✓	✓
Cable Route Preparation	✓	✓
Cable Construction	✓	✓
Cable Protection Methods	✓	✓
Cable Crossings	×	✓
Cable Construction Vessels	✓	✓
Offshore Export Cable Landfall	×	✓
Operation and Maintenance	✓	✓
Decommissioning	✓	✓

2.2. Marine Scheme Project Description (assessed as part of this RIAA)

2.2.1. Pre-Construction Surveys (Scottish and English Waters)

34. A number of pre-installation surveys will be required along the length of the Offshore Export Cable Corridor to:

- Further assess seabed conditions and morphology (e.g., to identify seabed features which may present technical constraints to cable installation);
- Identify presence and absence of potential obstruction, hazards or sensitive features (e.g. UXO, archaeological or ecological sensitivities); and
- Inform detailed design work e.g., specific cable routes, cable protection, final Landfall location and installation techniques.

35. These surveys will be conducted across the Offshore Export Cable Corridor. Timings of surveys will be dependent on programme and survey vessel availability and the duration of the surveys could range from a few weeks e.g., four to six weeks to six months (or longer) depending on the nature of the survey and accounting for factors such as weather downtime for example.

36. The pre-installation surveys are likely to involve a range of industry-standard techniques, including but not limited to:

- Geotechnical;
- Bathymetry;
- Side Scan Sonar (SSS);
- Sub-bottom Profiling (SBP); and
- Magnetometer/gradiometer.

2.2.2. Approach to Unexploded Ordnance (Scottish and English Waters)

37. The development of the Offshore Export Cable Corridor has been informed by consideration of a range of environmental, technical and commercial criteria. This includes high level consideration of UXO risk and based on available information in advance of offshore surveys. Routeing has sought to, where possible, avoid areas where there is a higher likelihood that a UXO would be encountered based on modern history and available datasets.

38. Informed by ongoing survey activities, the Applicant will seek to further refine the Offshore Export Cable route such that it avoids areas of highest UXO risk, and indeed individual potential targets which have been identified through survey outputs / engineering studies.

39. Notwithstanding, some UXO investigation may be required along the Offshore Export Cable route in advance of construction. If required, this is expected to include:

- More detailed investigation of potential UXO (pUXO) including invasive / penetrative techniques if required;
- Use of ROVs and/or divers to investigate the pUXO;
- Excavation of seabed sediment from around the pUXO to ascertain potential risk, and/or the requirement for clearance; and
- Movement of the pUXO.

40. UXO will be avoided via cable routeing where possible. The potential for interaction with UXO along the length of the Offshore Export Cable Corridor will be informed by a desk-based UXO risk assessment.

41. Following this desk-based assessment, UXO will be managed through the following approach:

- Pre-construction engineering and UXO geophysical surveys along the engineered Offshore Export Cable Route will be carried out to help inform the management of UXO risk;
- An assessment of UXO risk at each sampling / borehole location will be required in advance of geotechnical surveys. Where pUXO is identified, alternative locations will be selected for the geotechnical surveys and location of the pUXO recorded to inform micro-routeing;

- Where possible and safe to do so, any pUXO will be avoided via micro-routeing within the Offshore Export Cable Corridor; and
- Where micro-routeing is not possible for technical and safety reasons, individual pUXO investigations will be carried out to confirm the status and risk associated with specific targets. This is anticipated to include the localised removal of material surrounding the target (diver or ROV-based).

42. Based on this approach and the width of the Offshore Export Cable Corridor, it is assumed that UXO will be avoidable and clearance of UXO is considered unlikely and therefore not included within the scope of this Marine Licence Application (MLA) and supporting RIAA. In the unlikely event that UXO clearance is required at a future stage, this will be subject to separate licencing requirements (Marine Licences and European Protected Species (EPS) Licences from the MMO and/or MD-LOT depending on the location of the UXO) together with supporting impact assessments including an EPS Risk Assessment and associated Marine Mammal Mitigation Protocol (MMMP). In the event UXO clearance is required it will be undertaken in line with relevant industry best practice guidance including the Marine Environment: Unexploded Ordnance Clearance Joint Interim Position Statement (UK Government, 2022), including the provision and implementation of appropriate marine mammal mitigation.

2.2.3. Cable Route Preparation (Scottish and English Waters)

43. Prior to installation of the Offshore Export Cables, seabed features (e.g., sandwaves and boulders) and obstacles (e.g., discarded fishing gear and other debris) identified within the Offshore Export Cable Corridor may need to be cleared or avoided, depending on the final cable route (a relatively flat seabed surface is typically required for installation tools to achieve target burial depth). Seabed levelling/clearance techniques are anticipated to include:

- **Seabed levelling:** required to level the seabed prior to cable installation. Involves levelling or lowering of seabed features e.g., sandwaves to create a flat surface for cable installation;
- **Boulder clearance:** where boulders are present along the final cable routes these will also need to be cleared within a swathe of 25 m along each cable route to enable cable installation;
- **Pre-lay grapnel run (PLGR):** this is required to clear debris and other obstacles from the cable routes and involves towing a heavy grapnel with a series of specially designed hooks along the centreline of the route to gather debris such as trawler warps or crane wires from ships;
- **Crossing preparation:** Along the length of the Offshore Export Cable Corridor, there are a number of crossings with third-party assets. Each specific crossing will be designed in detail as part of the development and agreement of crossing and / or proximity agreements for each asset crossed by the Marine Scheme; and
- **Sea Trials:** In areas of especially hard or soft seabed, installation tools may be trialled by the installation contractor(s) to determine their capability to achieve the required depth. This could include trials of pre-trenching using a displacement plough, mechanical trencher / jet trencher or other similar means and to determine the efficacy of boulder clearance methodologies so as to minimise the potential use of cable protection.

2.2.4. Cable Construction (Scottish and English Waters)

44. A full description of the cable installation activity is provided in the Marine Scheme ES, Volume 2, Chapter 5: Project Description; a brief summary of this activity is included below.

45. The Offshore Export Cables will originate at the OCSPs within the BBWF array area from where they will be installed within the installation corridor to a Landfall location at Cambois, Northumberland.

46. The Offshore Export Cables will transfer power from the OCSPs within the BBWF array area however for the reasons explained in ES, Volume 2, Chapter 5: Project Description, the exact location of the OCSPs is not currently defined. There are no other activities associated with the OSCPs as part of the Marine Scheme.

47. The Marine Scheme will consist of up to a maximum of four HVDC cables. The cable circuits are made up of the Offshore Export Cables in either bipole or monopole design and will transmit power at a voltage up to 525 kV.

48. A range of cable installation tools may be required to install and bury the Offshore Export Cables to the minimum target burial depths, including:

- **Jet trenching:** water is injected at high pressure in the area surrounding the cable using a jetting tool. The cable sinks to the required target burial depth and sediment reconstitutes above the cable achieving simultaneous burial;
- **Mass Flow Excavator (MFE):** A method of trenching which can be used to precisely excavate material without direct interaction with the seabed by using a specialist MFE tool;
- **Mechanical trenching:** a trench is excavated in the seabed into which the cable is laid. This is generally used for hard/stiff sediments; and
- **Cable plough:** a towed plough is used to create a trench by mechanical interaction through the seabed, into which the cable is simultaneously inserted. These can also be used for pre-lay trenching or to backfill trenches post cable installation.

49. The main options being considered for the burial of the Offshore Export Cables are as follows:

- Separate cable lay and burial campaigns - cable is pre-laid (placed on the seabed in advance of trenching and burial);
- Simultaneous cable lay and burial – cable is laid at the same time as cable trenching and burial; and
- Separate trench and burial campaigns – cable is laid directly into pre-cut cable trenches, for example by plough.

2.2.5. Cable Protection Methods (Scottish and English Waters)

50. As discussed in the ES, Volume 2, Chapter 5: Project Description, the primary aim is to achieve minimum target burial depths through burial of the cables in the seabed. Where it is not possible to achieve minimum target burial depth (0.5 m) due to seabed conditions, additional cable protection will be required to protect the cable from third party damage or future exposure. A range of additional cable protection measures are being considered for the Marine Scheme. These include:

- Rock protection;
- Concrete mattresses;
- Sand, rock and grout bags; and
- Tubular protection systems (e.g. articulated split pipe).

2.2.6. Cable Crossings

51. It is anticipated that up to five cable crossings (all within English waters) will be required across the extent of the Offshore Export Cable Corridor This count includes:

- (1) North Sea Link (NSL) developed by National Grid Ventures (installed);
- (2) Scotland England Green Link / Eastern Link 1: Torness to Hawthorn Pit (E2DC) understood to be jointly developed by National Grid Electricity Transmission (NGET) and ScottishPower Transmission (SPT) (in planning); and
- (3) Blyth Offshore Demonstrator Project Array 2 (Phase 1) export cable (installed).
    - Whilst it is unlikely the final route for the Marine Scheme Offshore Export Cables will cross this export cable, it is included as a potential crossing as a worst case:
- (4) Blyth Offshore Demonstrator Project Array 4 (Phase 2) export cable (consented).
    - The exact location and timescales for construction are unknown, however, this asset is included as a potential crossing as a worst case:
- (5) Blyth Offshore Demonstrator Project Array 3a export cable (consented).
    - The exact location and timescales for construction are unknown, however, this asset is included as a potential crossing as a worst case:

2.2.7. Cable Installation Vessels

52. A range of installation vessels in Scottish and English waters will be required to complete the cable installation works. The types of vessels anticipated to be required for the installation activities are summarised below. Installation methods and technologies will be confirmed on award of the installation contract and will be within the maximum design scenario described. All vessels specified may also be supported by guard vessels. Vessels anticipated to be required include:

- Cable Lay Vessel (CLV) / cable installation vessel;
- Jack-up barge;
    - A jack-up barge may be used to support cable laying operations in the nearshore area at Cambois. They make contact with the seabed when the base structure of each leg (‘jack-up spud cans’) are lowered into place.
- Cable protection installation vessels;
- Support vessels; and
- Crew transfer vessels
- Guard vessels.

2.2.8. Offshore Export Cable Landfall (English Waters)

53. The Landfall location at Cambois forms the interface between the Marine Scheme and Onshore Scheme where the Offshore Export Cables will be brought ashore, as shown in Volume 4, Figure 5.2. The Landfall corridor is approximately 1.5 km wide at Cambois beach, at the widest point between the River Wansbeck and the Port of Blyth. The final location of the Landfall on Cambois beach is still to be determined but will be located within the wider Landfall Corridor.

54. The Offshore Export Cables will be installed at the Landfall using a trenchless technology such as HDD. This involves installing an underground cable duct by drilling a hole (or holes) from one point to another. The Offshore Export Cables are then installed through the duct(s). It is likely that the

holes will be drilled from a trenchless technology compound which will be located above MHWS (onshore) to an agreed 'punch out' location in the nearshore marine area (below MLWS), therefore completely bypassing the intertidal zone.

55. HDD is a trenchless installation methodology which avoids direct interactions within the intertidal zone, as shown in Plate 2. HDD can be carried out via a marine or shore-led methodology; it is described in detail in section 5.7.2.1 of ES, Volume 2, Chapter 5: Project Description.

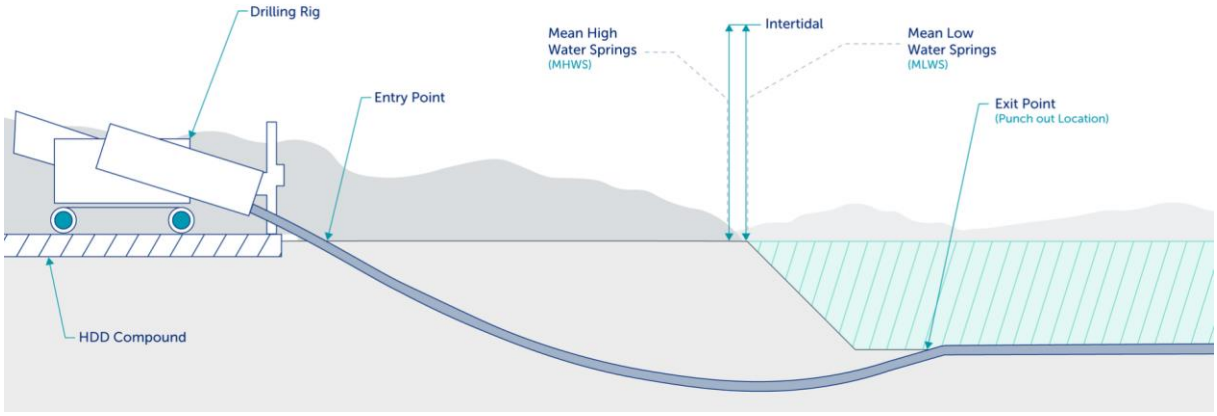


Plate 2 Depiction of HDD (indicative trenchless installation methodology)

2.2.9. Operation and Maintenance (Scottish and English Waters)

56. Once in place and buried (where possible), Offshore Export Cables do not typically require regular routine maintenance. It is likely that routine inspection of the Offshore Export Cables will be periodically required annually to monitor condition and burial throughout the life of the Marine Scheme. Any inspections would be undertaken using offshore surveys, including the use of remotely operated vessels (ROVs). Where inspection work concludes that work may be required along any length of the Offshore Export Cable route, maintenance would be carried out. This may involve re-positioning of rock protection or placement of additional rock protection.

57. The installation methods described above are designed to minimise the requirement for cable repair. However, natural processes and human activity may uncover buried cable and damage cable protection. The requirement for maintenance will be identified by inspections carried out by the Applicant. Where sections of the Offshore Export Cables require repair or replacement, it is expected that this will be undertaken by a number of different vessels consistent with those described above for the installation process, and depending on the location and seabed conditions where the repair is required (e.g., intertidal or subtidal). Cable repairs will be undertaken in a similar process to that described above.

2.2.10. Decommissioning

58. At the end of the operational lifetime of the Marine Scheme, the operator of the Marine Scheme will develop and agree a solution for the onward handling of the Offshore Export Cables with the regulator. This decision will be based on the advice from the marine regulator at the time and informed by the prevailing environmental regulatory requirements at that time, and relevant best-practice.

59. The approach to decommissioning will align with regulatory guidance, requirements and industry good practice at the time of decommissioning and will be agreed with the relevant stakeholder and regulatory bodies. It is proposed that Offshore Export Cables will be removed where practicable and appropriate to do so. This approach will be reviewed at the time of decommissioning following the most up to date and best available guidance. For the purpose of this RIAA, the most adverse scenario (in terms of potential for adverse effects to the site integrity of designated sites) has been assessed for each receptor identified for assessment.

60. A decommissioning plan and supporting decommissioning environmental management plan will be prepared prior to commencement of decommissioning and will be subject to its own environmental assessment. It is anticipated that this will be secured via a requirement of seabed leases from Crown Estate Scotland and The Crown Estate; decommissioning conditions are also anticipated to be secured on Marine Licences issued by MD-LOT and the MMO in Scottish and English waters respectively.

2.2.11. Summary of Project Design Envelope

61. Table 3 provides a summary of the PDE for the Marine Scheme; please refer to ES, Volume 2, Chapter 5: Project Description for full details.

Table 3 Summary of PDE for Marine Scheme

Activity	Parameter	Value (Marine Scheme whole)	Value (Scottish waters)	Value (English waters)
Offshore Export Cable Construction				
Footprint of Temporary seabed disturbance (seabed preparation, cable laying and protection)	Maximum levelling swathe / width of temporary seabed disturbance (per trench) (m)	25	25	25
	Total area of disturbance (4 cables) (km^2)	18	4	14
Cable Construction Details	Length of Marine Scheme (km)	180	40	140
	Maximum number of Offshore Export Cables	4	4	4
	Maximum number of Fibre Optic Cables	4	4	4
	Maximum total cable length (km)	720	160	560
	Maximum Operating voltage (kV)	525	525	525
	Maximum Offshore Export Cable Corridor width (km)	1	1	1
	Maximum number of trenches	4	4	4
	Maximum trench width (per circuit) (m)	2.5	2.5	2.5
	Minimum target burial depth (m)	0.5	0.5	0.5
	Maximum target cable burial depth (m)	3	3	3
Cable Installation Vessels[4]	Jack-Up: Maximum number of legs per vessel	6	N/A	6
	Jack-Up: Maximum individual effective leg diameter (m)	8.6	N/A	8.6
	Jack-Up: Maximum area of spud cans (m^2)	250	N/A	250
	Jack-Up: Maximum seabed footprint (km^2)	0.005	N/A	0.005
	Pre-installation boulder removal / clearing vessels	2	N/A	N/A
	Cable installation vessels	2	N/A	N/A
	Guard vessels	10	N/A	N/A
	Survey vessels	2	N/A	N/A

[4] Maximum number of vessels working at Marine Scheme at any one time (this is applicable to both Scottish Waters and English Waters but cannot be broken down as the vessels will be working along the transitory Offshore Export Cable Corridor), excluding the jack up barge which is relevant to English waters only.

Activity	Parameter	Value (Marine Scheme whole)	Value (Scottish waters)	Value (English waters)
	Crew transfer vessels	2	N/A	N/A
	Cable protection installation vessels	2	N/A	N/A
	Landfall jack-up barge	1	N/A	N/A
Cable Protection Methods	Maximum height of cable protection (m)	1.5	1.5	1.5
	Maximum width of cable protection (m)	9.5	9.5	9.5
	Maximum length of cable protection[5] (km)	37.131	6	31.131
	Maximum total footprint for cable protection (4 cables) (km^2)	1.41	0.23	1.18
Cable Crossings	Maximum number of crossings	5	0	5
	Crossing material / method	Rock placement/rock bags/concrete mattress / cast iron cast / CPS system	n/a	Rock placement/rock bags/concrete mattress / cast iron cast / CPS system
	Maximum height of each crossing (m)	2	N/A	2
	Maximum width of each crossing (m)	12.5	N/A	12.5
	Maximum length of each crossing (m)	200	N/A	200
	Maximum total area of all crossings for four cables (km^2)	0.05	N/A	0.05
Offshore Export Cable Landfall				
Landfall Details	Maximum number of trenchless cable ducts[6]	5	N/A	5
	Diameter of cable ducts (m)	0.3 – 2.5	N/A	0.3 – 2.5
	Maximum length of cable ducts (per duct) (m)	2,400	N/A	2,400
	Estimated trenchless burial depth (m) (intertidal)	30	N/A	30
	Dimension of exit pits (m) (subtidal)	20 x 5	N/A	20 x 5

5 It should be noted that the length does not include cable protection required for cable crossings

6 Maximum number of permanent trenchless cable ducts assumed to be four. Should a bore fail during trenchless Landfall installation. through encounter of unforeseen ground conditions or other failure, a spare bore may be required as such five bores are accounted for in the MDS.

2.3. Changes to the Design since HRA Screening

62. A list of the main changes to the PDE since the Applicant made a formal request for a Scoping Opinion to the MMO and MD-LOT, and subsequently submitted a Habitats Regulations Appraisal/Assessment screening request to Natural England and NatureScot. These refinements are summarised below:

- Avoidance of the Farnes East Marine Conservation Zone (MCZ) and selection of route options to the east of this designated site (post scoping);
- Removal of Landfall options to the north of the River Wansbeck (post scoping), providing a number of benefits including removing the requirement for an additional trenchless technology, such as HDD, under the River Wansbeck[7];
- Adoption of commitments to manage EMF exposure as far as practicable through cable burial and/or cable protection measures, delivered through management plans, including the Cable Plan (CaP). The Applicant is also committed to adjacent cables in opposite polarity to help reduce EMF associated with the Marine Scheme (grouping cables of opposite polarity will result in deleterious interference between the EMFs from adjacent cables, which will further reduce the field EMF strengths resulting from the Marine Scheme) – please refer to ES, Volume 2, Chapter 5: Project Description for further details; and
- Adoption of trenchless techniques at Landfall to avoid impact on the intertidal area and the habitats and species in this area (post HRA Screening).

2.4. Onshore Scheme Project Description (not assessed as part of this RIAA)

63. The Onshore Scheme will facilitate the transmission of green energy exported from the BBWF to the National Grid via onshore HVDC cables from the transition joint bays at the Landfall to a new onshore converter station. A maximum of four HVDC cables are proposed from the Landfall to the converter station, with installation anticipated to include trenchless techniques such as HDD. From the onshore converter station, HVAC cables will be installed (no overhead lines are proposed) to connect into the existing Blyth National Grid substation.

64. It should be noted that the Onshore Scheme is not considered within this RIAA but is considered in-combination with the Marine Scheme where relevant within this document.

2.5. Measures Adopted as Part of the Marine Scheme

65. In line with the IEMA (2016b) Guide to Delivering Quality Development and as part of the project design process, a number of designed in measures have been included in the Marine Scheme and are committed to be delivered by the Applicant as part of the Marine Scheme. These designed in

[7] A Landfall to the east of North Seaton would likely require an approach to the north-east of the River Wansbeck. In this area, there are understood to be larger volumes of intertidal rock meaning that installation of the Offshore Export Cables would be far more technically challenging, if not infeasible. Owing to engineering considerations, such as the cliff to the east of Sandy Bay caravan park, the selection of a method of landfalling would likely be more restricted at this location. As described above, this Landfall would require a river crossing under the River Wansbeck resulting in significant additional technical complexity, cost and the need for additional construction activity on the north and south banks of the River Wansbeck to facilitate a river crossing. For further details, please refer to Volume 2, Chapter 6: Route Appraisal and Consideration of Alternatives.

measures are integrated into the project description for the Marine Scheme and are not considered as mitigation measures intended to specifically avoid or reduce effects on European sites.

66. Designed in measures of relevance to the assessment of potential impacts are tabulated separately in each of the receptor sections, according to the effect-pathway under consideration.

67. Measures intended specifically to avoid or reduce effects on European sites were not considered during the HRA Stage One Screening but are included within the HRA Stage Two Appropriate Assessment for determination of Adverse Effects on Integrity. The RIAA will indicate whether adverse impacts on European sites are likely and if so, whether those effects can be avoided through the introduction of mitigation measures that avoid or reduce the impact. These measures are referred to as Secondary Mitigation and may be taken from topic chapters within the Offshore ES (Volume 2) or, where necessary, may have been developed specifically to comply with HRA requirements. Where the latter is the case, this is made clear throughout.

68. The relevant designed-in mitigation for each receptor assessed within the RIAA is considered within each relevant section below.

3. Legislation and Policy

3.1. International Commitments

69. The requirement to consider the potential effects of a plan or project on a European Site is outlined as part of the international commitments of the following pieces of European Union (EU) legislation:

- The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in the Habitats Regulations) (qualifying features of European sites located within the 12 nautical mile (nm limit) in Scottish Territorial waters;
- The Conservation of Offshore Marine Habitats and Species Regulations 2017 (applicable to Marine Licence applications between 12 nm and 200 nm);
- The Conservation of Habitats and Species Regulations 2017 (as amended) (applicable to applications extending seawards to 12 nm in English waters);
- The Conservation on Wetlands of International Importance especially as Waterfowl Habitat (the 'Ramsar Convention') (as implemented through the Habitats Regulations[8])
- European Directive 92/43/EEC on the 'Conservation of Natural Habitats and Wild Fauna and Flora' (referred to as the 'Habitats Directive'); and
- Council Directive 2009/147/EC (Birds Directive) and the Conservation of Wild Birds (the codified version of Council Directive 79/409/EEC on the conservation of wild birds) (referred to as the 'Wild Birds Directive').

70. Sites designated under these directives, regulations and conventions are collectively referred to as European Sites and include: Special Areas of Conservation (SAC); candidate SAC (cSAC); Special Protection Areas (SPA); sites listed as a site of community importance (SCI); possible SACs (pSAC) and potential SPAs (pSPA). All Ramsar sites are also Natura 2000 sites (taken as European sites, see paragraph 74 below).

71. The Habitats Directive and the Birds Directive have been transposed into Scottish and English Law through The Conservation (Natural habitats, &c.) Regulations 1994 (as amended) and The Conservation of Habitats and Species Regulations 2017 respectively. The Conservation of Offshore Marine Habitats and Species Regulations 2017 transpose the Habitats Directive into Scottish and English Law for offshore waters.

72. These regulations are collectively referred to as the 'Habitats Regulations'.

73. Following the UK's exit from the European Union (EU) in January 2020, the European Union (Withdrawal Agreement) Act 2020 was transposed into English and Scottish Law through The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 and The Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019 respectively.

[8] 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).

3.2. European Sites Post EU Exit

74. European sites are commonly referred to as Natura 2000 sites (as part of the Natura 2000 Network).

75. Following the UK's exit from the EU (referred to as EU Exit) in January 2020, the UK was no longer part of the Natura 2000 Network. Hereafter, all sites within the UK and the EU are referred to as European Sites, with Natura 2000 Network sites collectively referred to as the UK's 'National Site Network'. The National Site Network encompasses all European Sites within the UK that were designated pre-EU Exit (i.e., those sites which were already designated under the Habitats and Birds Directives) or proposed to the European Commission pre-EU Exit and any new protected sites designated under the Habitats and Birds Regulations under an amended designation process.

3.3. Statutory Requirements for the Assessment

76. The Habitats Regulations require for an assessment of the implications of a plan or project on a European Site's conservation objectives to be undertaken by the Competent Authority prior to giving consent (please see the following Regulations under each piece of legislation:

- Regulation 63 of The Conservation of Habitats and Species Regulations 2017 (as applicable in England for the Onshore Scheme); and
- Regulation 28 of The Conservation of Offshore Marine Habitats and Species regulations 2017 (as applicable in Scotland and England for the Marine Scheme)[9].

77. The wording of these Regulations is very similar and outline the requirements for HRA assessment, stating that (e.g., Regulation 28 of the Conservation of Offshore Marine Habitats and Species regulations 2017):

'(1)Before deciding to undertake, or give any consent, permission or other authorisation for, a relevant plan or project, a competent authority must make an appropriate assessment of the implications for the plan or project for the site in view of that site's conservation objectives[…] (5)…the competent authority may agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European offshore marine site or European site (as the case may be)'.

78. The Habitat Regulations also require that (e.g., Regulation 28 of the Conservation of Offshore Marine Habitats and Species Regulations 2017):

'(3) A person applying to a competent authority for any consent, permission or other authorisation for a plan or project in the offshore marine area must provide such information as the competent authority may reasonably require (a) to enable it to determine whether an assessment under paragraph (1) is required; or (b) for the purposes of the assessment under paragraph (1)'.

[9] As there are no aspects of the Cambois Connection within Scottish territorial waters (0-12 nm), the Conservation (Natural Habitats, &c.) Regulations 1994 are not applicable.

3.4. The HRA Process

79. HRA is generally recognised as a progressive and staged process built around the wording of Articles 6(3) and 6(4) of the Habitats Directive, with the outcome at each stage defining the requirement for and scope of the next. These stages are summarised in Plate 3 below.

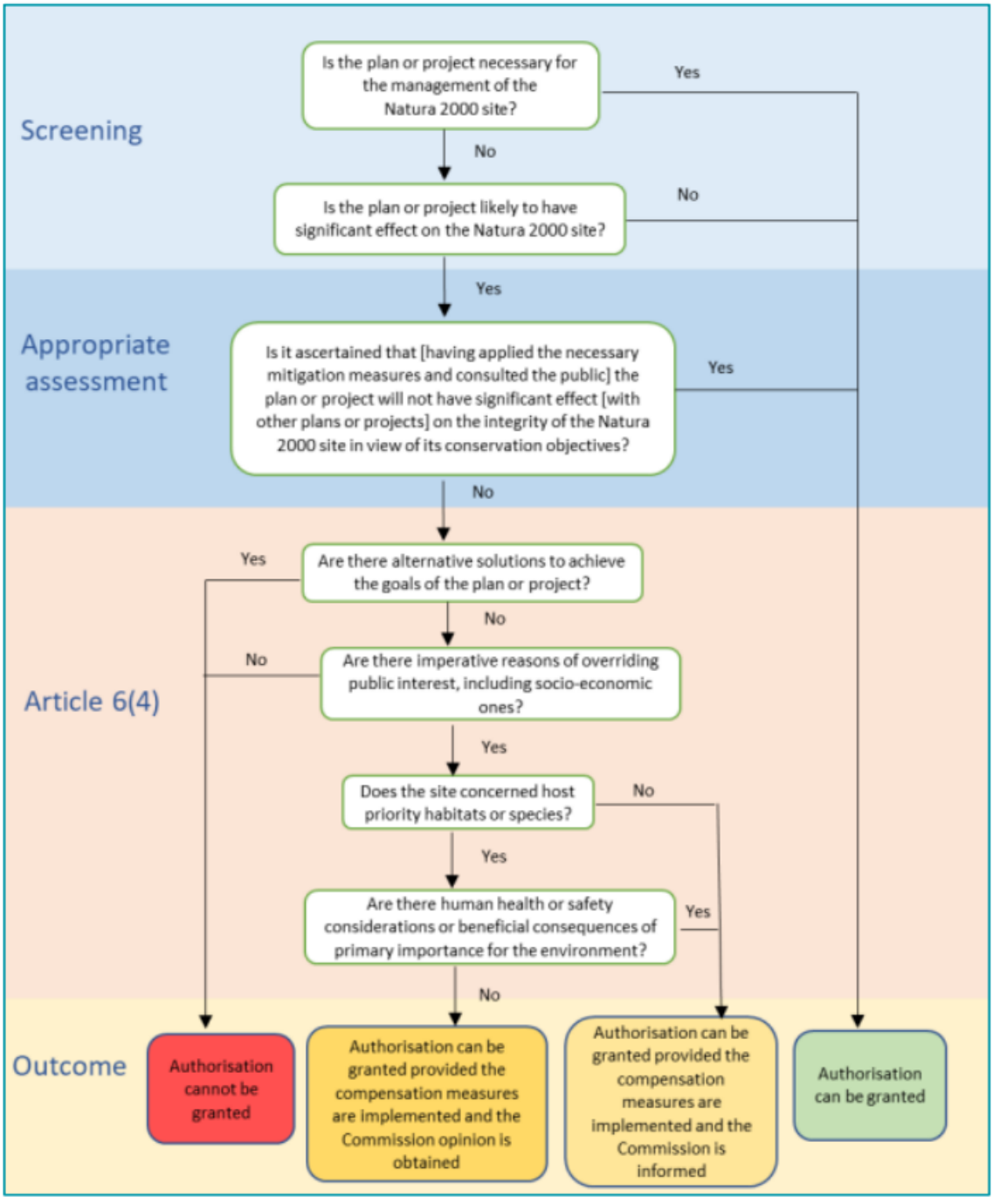


Plate 3 Staged HRA Process Summary (EU Commission, 2021)

80. In the UK, the requirements of the Habitats Regulations are extended to consider the potential effect of a plan or project on Ramsar sites (as identified under the Ramsar Convention on Wetland of International Importance). Despite recent changes to the Habitats Regulations post EU Exit, the approach to HRA remains unchanged (Scottish Government, 2020). This HRA assessment has been carried out with reference to the general European Commission (EC) guidance on HRA (European Commission, 2001), general guidance on HRA published by the UK Government in 2021 (UK Government, 2021) (hereafter referred to as 'joint guidance'). This assessment also considered guidance from the MMO (2014).

81. The Project is not a Nationally Significant Infrastructure Project (NSIP) and therefore is not subject to the Planning Act 2008 nor will it be consented through a Development Consent Order. Notwithstanding, the stages outlined in the Planning Inspectorate (PINS) Advice Note 10 (The Planning Inspectorate, 2022) can be used as a useful source of staged guidance. This guidance is not mandatory or statutory, however it will be followed voluntarily to inform the HRA process (in the absence of any other appropriate similar guidance it is considered appropriate to follow for the Project).

82. Joint guidance (UK Government, 2021) has identified a three-stage process to HRA assessment, as outlined below. It may not be necessary to complete all stages, depending on the conclusion reached at each stage. These stages are:

- Stage One: HRA Screening for Likely Significant Effects;
- Stage Two: Report to Inform Appropriate Assessment (fulfilled by this RIAA); and
- Stage Three: Derogation.

83. Whilst the PINS guidance (The Planning Inspectorate, 2017) and the joint guidance (UK Government, 2021) have discrete differences, they are considered complimentary to each other and both have been used to inform this HRA Screening. The HRA Stage One Screening Report was prepared in support of Stage One of the HRA process. As a result of Stage One, the requirement for Stage Two was concluded. Stage Two will be completed alongside the ES, with the results presented in full as part of this RIAA.

3.4.1. Stage One: HRA Screening for Likely Significant Effects

84. The purpose of Stage One is to identify European Sites which have potential connectivity with the Project and to identify which aspects of the Project, in the absence of secondary mitigation have the potential to result in pathways for LSE[10] on the qualifying features and conservation objectives of a European Site, either alone or in-combination with other plans or projects. Where a potential pathway for LSE is identified, these sites will be taken forward for further assessment as part of Stage Two. Where LSE cannot be identified for a European Site, it will be ruled out for further assessment.

85. Stage 1 has been undertaken and an HRA Stage One Screening Report (BBWFL, 2023a, included as Appendix 1) was submitted to the Competent Authorities (MD-LOT, MMO and NCC) on 30 March 2023.

[10] A significant effect should be considered likely if it cannot be excluded on the basis of objective information and it might undermine a site's conservation objectives (UK Government, 2019).

3.4.2. Stage Two: Report to Inform Appropriate Assessment (RIAA) – as fulfilled by this document

86. This RIAA has been prepared to fulfil the requirements of Stage Two of the process. As part of Stage Two, it is required that each LSE of the Marine Scheme is considered alone and in-combination with other existing or planned projects and plans within the zone of influence (ZOI) on the integrity of the European Sites screened in for assessment during Stage One.

87. The ZOI is defined as the spatial area over which receptors may be affected by biophysical changes as a result of the Project and associated activities, a definition which is in accordance with the CIEEM guidance for ecological impact analysis (CIEEM, 2019). Whilst it is acknowledged that this definition is specific to and derived from EIA guidance, it is considered appropriate to application within HRA screening.

88. The habitats and species of qualifying interest and the conservation objectives of the European Site should be considered as part of the assessment. This RIAA also summarises the conclusions of the HRA Stage One Screening Report (BBWFL, 2023a) and also details any additional information or changes, since this was published in March 2023, to account for feedback received from stakeholders during consultation.

3.4.3. Stage Three: Derogation

89. If it cannot be concluded that there are no 'adverse effects on site integrity (AEOSI) of a European Site, the site will be taken forward for consideration as part of Stage Three. There are three tests at this stage to be followed in order: 1) consideration of alternative solutions; 2) consideration of Imperative Reasons of Overriding Public Interest (IROPI); and 3) application of compensatory measures. Each test must be passed for each relevant European Site for a derogation to be granted.

3.4.4. Guidance Documents

90. Post departure from the EU, reference to European Community (EC) on the HRA process is still currently relevant. The Habitats Regulations in Scotland (Marine Scotland, 2020) states that guidance may be updated and/or new guidance may be produced. However, in the shorter term existing guidance continues to apply and should still be used.

91. The following publications were referenced, to seek guidance on changes to the Habitats Regulations and their interpretation from January 2021:

- Scottish Government (December 2020) EU Exit: The Habitats Regulations in Scotland (Marine Scotland,2020); and
- Department for Environment, Food and Rural Affairs (January 2021) Policy Paper – Changes to the Habitats Regulations 2017 (DEFRA, 2021).

92. The following guidance documents have been utilised in the preparation of this RIAA:

- Scottish Natural Heritage (January 2015) (Published 2019) Habitats Regulations Appraisal of Plans -Guidance for plan-making bodies in Scotland – Jan 2015;
- Scottish Natural Heritage (2019) SNH Guidance Note: The handling of mitigation in Habitats Regulations Appraisal – the People Over Wind CJEU judgement;

- Scottish Natural Heritage (2016) Habitats Regulations Appraisal (HRA) on the Firth of Forth A Guide for developers and regulators;
- Scottish Government (2013) HRA Advice Sheet 1 – Aligning Development Planning procedures with Habitats Regulations Appraisal requirements (Version 1 – July 2012);
- Scottish Government (2018). Marine Scotland Consenting and Licensing Guidance for Offshore Wind,Wave and Tidal Energy Applications. October 2018;
- Scottish Natural Heritage (2014). Natura Casework Guidance: How to consider plans and projects affecting Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). February 2014;
- European Commission (EC) (2021) Assessment of plans and projects in relation to Natura 2000 sites – Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC. European Commission Notice Brussels C (2021) 6913 final;
- EC (2020) Guidance document on wind energy developments and EU nature legislation. European Commission Notice Brussels C (2020) 7730 final;
- EC (2018) Managing Natura 2000 sites. The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC';
- EC (2007) Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EE. Clarification on the Concepts of: Alternative Solutions, Imperative Reasons of Overriding Public Interest, Compensatory Measures, Overall Coherence, Opinion of the Commission;
- EC (2006) Nature and Biodiversity Cases Ruling of the European Court of Justice; and
- The Habitats Regulations Assessment Handbook (Tyldesley and Chapman, 2021).
- Planning Inspectorate, Advice Note Ten: Habitats Regulations Assessment (relevant to NSIP projects but contains useful information relevant to the HRA process in general).

3.4.5. Relevant Case Law

93. This RIAA has been prepared in consideration of relevant case law concerning the Habitats Regulations.

3.4.5.1. CONSIDERATION OF MITIGATION MEASURES

94. The Court of Justice of the European Union (CJEU) ruled that mitigation measures could not be taken into account at the screening stage of appropriate assessment in C-323/17 'People Over Wind and Sweetman v Coillte Teoranta' (April 2018) (Sweetman 2). NatureScot (formerly Scottish Natural Heritage (SNH)) subsequently provided guidance relating to how mitigation should be considered as part of the HRA process in Scotland (SNH, 2019). NatureScot interpreted the judgment from the European Court of Justice as stating that mitigation measures that intend to avoid or reduce harmful effects to a European Site cannot be considered at the screening stage. However, embedded mitigation measures which are not specifically designed to avoid or reduce effects on a European Site, but do so incidentally, can be considered. Therefore, there must be a distinction between these two types of mitigation. The HRA Screening Stage 1 report (BBWFL, 2023) complied with this judgment and no mitigation measures other than embedded measures were considered.

3.4.5.2. ADVERSE EFFECTS ON THE INTEGRITY OF EUROPEAN SITE

95. The European Commission's guidance on managing Natura 2000 sites (EC, 2018) advises that the purpose of the appropriate assessment is to assess the implications of the plan or project in respect of the site's Conservation Objectives, either individually or in combination with other plans or

projects. The conclusions should enable the Competent Authorities to ascertain whether the plan or project will adversely affect the integrity of the site concerned. The focus of the appropriate assessment is therefore specifically on the species and/or the habitats for which the European site is designated.

96. The guidance highlights the importance of using the best scientific knowledge whilst carrying out the appropriate assessment to enable the Competent Authorities to conclude with certainty that there will be no adverse effects on the integrity of the site. At the time of deciding to authorise a project there must be no reasonable scientific doubt remaining as to the absence of adverse effects on the integrity of the site in question.

97. In its ruling in Case C-258/11, the CJEU confirmed that 'Article 6(3) of the Habitats Directive must be interpreted as meaning that a plan or project not directly connected with or necessary to the management of a site will adversely affect the integrity of that site if it is liable to prevent the lasting preservation of the constitutive characteristics of the site that are connected to the presence of a priority natural habitat whose conservation was the objective justifying the designation of the site in the list of SCIs, in accordance with the directive. The precautionary principle should be applied for the purposes of that appraisal'. EC (2018) advises that the logic of such an interpretation would also be relevant to nonpriority habitat types and to habitats of species.

98. EC, (2018) details that the 'integrity of the site' can be defined as the coherent sum of the site's ecological structure, function and ecological processes, across its whole area, which enables it to sustain the habitats, complex of habitats and/or populations of species for which the site is designated. In Sweetman, Ireland, Attorney General, Minister for the Environment, Heritage and Local Government v An Bord Pleanála) (C258/11) (Sweetman 1) it was determined that the ecological structure and function of a European site would be adversely affected with reference to the site's overall ecological functions and "the lasting preservation of the constitutive characteristics of the site."

99. EC (2018) notes that if the competent authority considers the mitigation measures sufficient to avoid adverse effects on site integrity as identified in the appropriate assessment, they will become an integral part of the specification of the final plan or project or may be listed as a condition for project approval.

100. EC (2020) advises that the decision to approve a project or plan (by the competent authority) can only be taken once certain that the plan or project will not adversely affect the integrity of the site. That is the case where no reasonable scientific doubt remains as to the absence of such effects.

101. EC (2020) reaffirms that the authorisation criterion laid down in the second sentence of Article 6(3) of the Habitats Directive integrates the precautionary principle and makes it possible to effectively prevent protected sites from suffering adverse effects on their integrity as the result of the plans or projects. A less stringent authorisation criterion would not be as effective in ensuring the realisation of the objective of site protection intended under that provision.

102. Therefore, the obligation is to demonstrate the absence of adverse effects rather than their presence, reflecting the precautionary principle. The appropriate assessment must be sufficiently detailed and reasoned to demonstrate the absence of adverse effects, identified in the light of the best scientific knowledge in the field and where no reasonable scientific doubt remains as to the absence of such effects.

103. The measure of significance is made against the Conservation Objectives for which the sites were designated as per the Waddenzee Judgment[11].

3.4.5.3. CONSIDERATION OF *EX SITU* EFFECTS

104. EC (2018) advises that Article 6(3) and Article 6(4) safeguards be applied to European sites subject to LSEs from any development pressures, including those which are external to those European site(s).

105. This point was reaffirmed by the CJEU, when it issued a ruling in case C-461/17 ("Brian Holohan and Others v An Bord Pleanála") that determined inter alia that Article 6(3) of Directive 92/43/EEC must be interpreted as meaning that an appropriate assessment must catalogue the entirety of habitat types and species for which a site is protected, as well as identify and examine both the implications of the proposed project for the species present on that site, and for which that site has not been listed.

106. Therefore, where relevant consideration has been given at HRA Screening Stage 1 (and where necessary, based on the outcomes of that Screening) in this RIAA to implications for habitats and species located both inside and outside of the European sites with reference to those sites' Conservation Objectives where effects upon those habitats and/or species are liable to affect the Conservation Objectives of the sites concerned.

11 Landelijke Vereniging tot Behoud van de Waddenzee and Nederlandse Vereniging tot Bescherming van Vogels v Staatssecretaris van Landbouw, Natuurbeheer en Visserij (C-521/12)

4. Consultation

107. Consultation has been undertaken with statutory stakeholders during key stages of the Marine Scheme. As explained above, consultation was undertaken with MD-LOT / NatureScot and MMO / Natural England in Scottish and English waters respectively.

108. Alongside feedback provided on the approach to HRA within the Scoping Opinions from MD-LOT and MMO (MD-LOT, 2023; MMO, 2023), advice on the HRA Stage One Screening report was received from NatureScot on the 5 May 2023 and from Natural England on the 18 May 2023 (NatureScot, 2023b; Natural England, 2023a). Comments received have been taken into consideration, as far as is appropriate, during the development of the RIAA.

109. Further, this RIAA has been developed alongside the Marine Scheme Offshore ES. Where design, supporting information or stakeholder feedback is common to both assessments this has been used, as referenced. Consultation has been undertaken with statutory stakeholders throughout the development of the Project and the Marine Scheme. In regard to HRA specifically consultation pertaining to Annex I habitat (coastal and subtidal), Annex II diadromous fish and Annex II marine mammal features of SACs has taken place.

110. A summary of the details of all consultation undertaken to date which is relevant to the RIAA and the HRA process in general, is presented in Table 4.

Table 4 Consultation undertaken in relation to the RIAA and HRA process

Date	Consultee Stakeholder	Topic / receptor / site	Relevant jurisdiction	Issues Discussed / comment received	How and Where Considered in the RIAA
Consultation on the Marine Scheme: Pre-Application Engagement					
16 March 2022	MMO and MD-LOT	Ecology and Nature Conservation / HRA	England and Scotland	A meeting was held to introduce the Project to the relevant marine regulators for the Marine Scheme. The approach to the MLAs was presented, as well as the intended approach regarding MLA submissions in both Scotland and England. The Applicant also presented on the key constraints of the broad Offshore Export Cable Corridor and how they would be considered going forward. A summary of the intended scope of and approach to surveys was provided (benthic and geophysical for the Marine Scheme, and Phase 1 Habitats and Species surveys for the Onshore Scheme which were presented for completeness).	Whilst constraints for a broad Offshore Export Cable Corridor identified at this time between BBWF and Cambois, encompassing two narrower corridor options, were presented with the intent to take the broad corridor forward for Scoping, both MMO and MD-LOT did not raise any concerns regarding identified environmental constraints or potential consenting risks. As noted during the meeting, the Applicant sought further advice from Natural England on the broad Offshore Export Cable Corridor for further refinement of the corridor route. As part of this workshop, the Applicant discussed the need for coordination between authorities and how this may aid the consenting process for the Marine Scheme and Onshore Scheme. Both MD-LOT and MMO were briefed regarding the intended timeframes of and approach to EIA Scoping. The MMO's advice to engage with Natural England regarding the scope of and approach to surveys was followed
24 March 2022	Natural England – consultation meeting	Ecology and Nature Conservation / HRA	England	A meeting was held to introduce the Project, and to discuss a range of topics of relevance to ecology and nature conservation, as well as the intended approach and scope of the ensuing EIA	Follow-up meetings to agree specifics around ornithology data requirements. As reported in ES, Volume 2, Chapter 10: Offshore and Intertidal Ornithology, overwintering (non-

Date	Consultee Stakeholder	Topic / receptor / site	Relevant jurisdiction	Issues Discussed / comment received	How and Where Considered in the RIAA
				and Habitats Regulations Appraisal / Assessment (HRA). The intended approach to the impact assessment for ornithology was discussed; specifically, this included the Applicant's position that a desk-based approach to offshore ornithology would be followed which was outlined by the Applicant as being proportionate to the scale and nature of a cable project. Natural England were in agreement.	breeding) surveys have supported the assessment of potential impacts on ornithology and this has helped to inform the RIAA. For further details, please refer to section 6: Approach to RIAA). Following presentation of the two Offshore Export Cable Corridor options identified at this stage within a broad corridor, Natural England recommended avoiding the Farnes East MCZ where possible and advised that if avoidance was not possible then further considerations would be needed (for full details regarding the MCZ. Please see the MPA and MCZ Assessment (which accompanies this application).
22 April 2022	Natural England – consultation meeting	Ornithology	England	Discussion around quality and availability of existing baseline ornithology data and best EIA practices for use of the data.	The Applicant scheduled additional follow-up meetings and investigated available baseline data. This helped inform the approach to the EIA and RIAA, as reported within this document. For further details, please refer to section 6 (approach to RIAA).
6 July 2022	Natural England – consultation meeting	Ecology and Nature Conservation / HRA / Ornithology	England	Discussion of the Applicant's position regarding overwintering bird surveys. Based on the wealth of existing ornithological data in the area, the Applicant did not propose overwintering (non-breeding) bird surveys; Natural England were accepting of this but suggested it may lead to a risk of seasonal conditions.	Benthic, intertidal benthic and geophysical surveys were carried out in accordance with the proposals presented to Natural England. Where required, surveys were optimised to achieve optimal analysis and reporting. Discretionary advice provided to the Applicant following this meeting was also used to inform survey activity for the Marine Scheme.

Date	Consultee Stakeholder	Topic / receptor / site	Relevant jurisdiction	Issues Discussed / comment received	How and Where Considered in the RIAA
				Natural England explained to the Applicant during the course of the meeting that a potential overwintering condition (interpreted to relate to an effective ban on licensable activities between 01 November and 31 March) would likely negate the need for further non-breeding (overwintering) surveys. However, noting that if flexibility or work within this period may be required, Natural England explained that the Applicant should consider survey requirements further. Natural England provided a clear request for non-breeding (winter) bird survey covering coastal habitats if the Applicant were to pursue work during the winter period. Aside from ornithology, the Applicant provided details of planned onshore and marine survey campaigns (this included an open discussion around the approach to and scope of offshore benthic and geophysical surveys). The Applicant proposed engagement with Natural England on the Scope of and approach to the intertidal benthic survey.	At this relatively early stage in the design process and recognising that a contractor(s) has not been engaged, nor has a detailed programme been provided, it is not possible to rule-out working during the winter period. This was discussed with Natural England previously and on the basis of their clear advice, surveys were commissioned in order to provide the required level of flexibility. Non-breeding bird survey of Cambois coast undertaken over 2022/23 winter. Survey results summarised in this document and within ES, Volume 2, Chapter 10: Offshore and Intertidal Ornithology and ES, Volume 3, Appendix 10.1: Non-Breeding / Over-Wintering Bird Survey Report. For further details, please refer to section 6 (approach to the RIAA).
Consultation on the Marine Scheme: Scoping Opinion					
20 January 2023	Natural England: Scoping Response	Internationally Designated Sites	England	The ES should thoroughly assess the potential for the proposal to affect designated sites. Internationally designated sites (e.g. designated Special Areas of Conservation (SAC) and Special Protection Areas (SPA)) fall within the scope of the Conservation of Habitats and Species Regulations 2017 (as amended). In addition, paragraph 181 of the National Planning Policy	Potential impacts to internationally designated sites are assessed through the HRA process. The Applicant has fulfilled HRA requirements through HRA Stage One Screening, which is documented in the HRA Stage One Screening Report (BBWFL, 2023a) and this RIAA.

Date	Consultee Stakeholder	Topic / receptor / site	Relevant jurisdiction	Issues Discussed / comment received	How and Where Considered in the RIAA
				Framework requires that potential Special Protection Areas, possible Special Areas of Conservation, listed or proposed Ramsar sites, and any site identified as being necessary to compensate for adverse impacts on classified, potential or possible SPAs, SACs and Ramsar sites be treated in the same way as classified sites. (NB. Sites falling within the scope of regulation 8 of the Conservation of Habitats and Species Regulations 2017 are defined as 'habitats sites' in the NPPF).	
20 January 2023	Natural England: Scoping Response	Internationally Designated Sites	England	The proposed cable routes of the development are within or in proximity to the following internationally designated nature conservation sites: • Lindisfarne SPA • Lindisfarne Ramsar site • Farne Islands SPA • Northumbria Coast SPA • Coquet Island SPA • Northumberland Marine SPA	An assessment to decide which designated sites, the Marine Scheme has potential connectivity to was undertaken as part of HRA Stage One Screening. Where LSE was identified for these sites, they were brought forward for assessment as part of this RIAA. Sites for inclusion within this RIAA was also informed by Screening Responses received by NatureScot and Natural England (NatureScot, 2023b; Natural England, 2023a). Farne Islands SPA, Northumbria Coast SPA, Coquet Island SPA and Northumberland Marine SPA are included for assessment to ornithological features (section 5.3). During HRA Screening Stage One, Lindisfarne SPA and Ramsar site were screened out for assessment in the RIAA, based on the foraging distances of the qualifying species and the distance of the nearest landfall activities to the site (53 km). Screening advice received from Natural England does not request Lindisfarne

Date	Consultee Stakeholder	Topic / receptor / site	Relevant jurisdiction	Issues Discussed / comment received	How and Where Considered in the RIAA
					SPA/Ramsar to be included as part of the RIAA (Natural England, 2023a).
20 January 2023	Natural England: Scoping Response	Internationally Designated Sites	England	Further information on the special interest features, their conservation objectives, and any relevant conservation advice packages for designated sites is available on our website https://designatedsites.naturalengland.org.uk	Noted and this reference has been utilised in informing this RIAA.
20 January 2023	Natural England: Scoping Response	Internationally Designated Sites	England	The ES should include a full assessment of the direct and indirect effects of the development on the features of special interest within these sites, and should identify such mitigation measures as may be required in order to avoid, minimise or reduce any adverse significant effects.	Potential impacts to internationally designated sites are fully assessed through the HRA process. The Applicant has fulfilled HRA requirements through HRA Stage One Screening, which is documented in the HRA Stage One Screening Report (BBWFL, 2023a) and this RIAA. Mitigation measures have been considered as part of each of the assessments included within this RIAA.
20 January 2023	Natural England: Scoping Response	HRA	England	If the proposal outlined within the scoping document has the potential to significantly affect features of the internationally designated sites and the activity is not directly connected to the management of any designated site it should be assessed under regulation 63 the Conservation of Species and Habitats Regulations (2017). Should a Likely Significant Effect on an Internationally designated site be identified or be uncertain, the competent authority (e.g. the Marine Management Organisation or Local Planning Authority or Government Department) may need to prepare an Appropriate Assessment, in addition to consideration of impacts through the EIA process.	Potential impacts to internationally designated sites are assessed through the HRA process. The Applicant has fulfilled HRA requirements through HRA Stage One Screening, which is documented in the HRA Stage One Screening Report (BBWFL, 2023a) and this RIAA.

Date	Consultee Stakeholder	Topic / receptor / site	Relevant jurisdiction	Issues Discussed / comment received	How and Where Considered in the RIAA
20 January 2023	Natural England: Scoping Response	HRA	England	If during the EIA process the potential for a Likely Significant Effect on the conservation objectives of the sites cannot be ruled out the competent authority for the marine licence (MMO / Government Department) should undertake an Appropriate Assessment of the implications for the site in view of its conservation objectives. Noting recent case law (People Over Wind3) measures intended to avoid and/or reduce the likely harmful effects on a European Site cannot be taken into account when determining whether or not a plan or project is likely to have a significant effect on a site, therefore consideration is required at Appropriate Assessment. Natural England wishes to be consulted on the scope of the Habitats Regulations Assessment and the information that will be produced to support it and should be formally consulted on any Appropriate Assessment provided for the proposal (Regulation 63).	Potential impacts to internationally designated sites are assessed through the HRA process. The Applicant has fulfilled HRA requirements through HRA Stage One Screening, which is documented in the HRA Stage One Screening Report (BBWFL, 2023a) and this RIAA. Relevant Case Law has been utilised to inform this RIAA, as detailed in section 3.4.5. The Applicant understands that mitigation cannot be taken into account when determining LSE at HRA Screening Stage One, this was adhered to at Stage One (BBWFL, 2023a). Relevant mitigation measures are presented as part of each assessment included within this RIAA.
20 January 2023	Natural England: Scoping Response	HRA	England	The consideration of Likely Significant Effects should include any functionally linked habitat outside the designated site. These areas may provide important habitat for mobile species populations that are qualifying features of the site, for example birds and bats. This can also include areas which have a critical function to a habitat feature within a designated site, for example by being linked hydrologically or geomorphologically. Further guidance is set out in Planning Practice Guidance on appropriate assessment here: Appropriate assessment – GOV.UK (www.gov.uk)	Where relevant, functionally linked habitat outside designated sites has been considered within this assessment.

Date	Consultee Stakeholder	Topic / receptor / site	Relevant jurisdiction	Issues Discussed / comment received	How and Where Considered in the RIAA
20 January 2023	Natural England: Scoping Response	Nationally Designated Sites	England	Further information on the special interest features, the conservation objectives, and relevant conservation advice packages for designated sites is available on our website https://designatedsites.naturalengland.org.uk/	Noted and this reference has been utilised in informing this RIAA
20 January 2023	Natural England: Scoping Response	Protected Sites	England	The ES should assess the impact of all phases of the proposal on protected species (including, for example, pinnipeds (seals), cetaceans (including dolphins, porpoises whales), fish (including seahorses, sharks and skates), marine turtles, birds, marine invertebrates, bats, etc.). Information on the relevant legislation protecting these species can be reviewed on the following link https://www.gov.uk/government/publications/protected-marine-species. Natural England does not hold comprehensive information regarding the locations of species protected by law, but advises on the procedures and legislation relevant to such species. Records of protected species should be sought from appropriate local biological record centres, nature conservation organisations, NBN Atlas, groups and individuals; and consideration should be given to the wider context of the site for example in terms of habitat linkages and protected species populations in the wider area, to assist in the impact assessment.	Potential impacts to internationally designated sites are assessed through the HRA process. The Applicant has fulfilled HRA requirements through HRA Stage One Screening, which is documented in the HRA Stage One Screening Report (BBWFL, 2023a) and this RIAA. This process has taken account of all relevant qualifying features and has drawn on detailed information presented in Volume 2 of the Marine Scheme ES (2023b).
20 January 2023	Natural England: Scoping Response	Protected Sites	England	In order to provide this information there may be a requirement for a survey at a particular time of year. Surveys should always be carried out in optimal survey time periods and to current guidance by suitably qualified and where necessary, licensed, consultants. For Land Based	Surveys carried out to support the Marine Scheme have been carefully planned in order to gain the most representative and accurate data. Survey plans were discussed with relevant stakeholders for comment.

Date	Consultee Stakeholder	Topic / receptor / site	Relevant jurisdiction	Issues Discussed / comment received	How and Where Considered in the RIAA
				Impacts: Natural England has adopted standing advice for protected species which includes links to guidance on survey and mitigation. Protected species and development: advice for local planning authorities – GOV.UK (www.gov.uk)	As explained above, this included detailed discussions with Natural England regarding benthic and geophysical surveys (Natural England were also consulted on the scope of and approach to non-breeding bird surveys; for full details regarding the surveys carried out, please refer to ES, Volume 2, Chapter 10: Offshore and intertidal ornithology). Natural England Guidance for protected species has been utilised in survey planning.
14 March 2023	MMO: Scoping Opinion	Designated Sites	England	**Northumbria Coast SPA and Northumbria Coast Ramsar** The ES should thoroughly assess the potential for the proposal to affect designated sites. Internationally designated sites (e.g. designated Special Areas of Conservation (SAC) and Special Protection Areas (SPA)) fall within the scope of the Conservation of Habitats and Species Regulations 2017 (as amended). In addition paragraph 181 of the National Planning Policy Framework requires that potential Special Protection Areas, possible Special Areas of Conservation, listed or proposed Ramsar sites, and any site identified as being necessary to compensate for adverse impacts on classified, potential or possible SPAs, SACs and Ramsar sites be treated in the same way as classified sites.	Potential impacts to internationally designated sites are assessed through the HRA process. The Applicant has fulfilled HRA requirements through HRA Stage One Screening, which is documented in the HRA Stage One Screening Report (BBWFL, 2023a, included as Appendix 1) and this RIAA. The potential for adverse effects on site integrity to the Northumbria Coast SPA and Northumberland Coast Ramsar is considered in section 2.4 of Part 2 of the RIAA
14 March 2023	MMO: Scoping Opinion	Designated Sites	England	**Northumbria Coast SPA and Northumbria Coast RAMSAR**	Potential impacts to internationally designated sites are assessed through the HRA process. The Applicant has fulfilled HRA requirements

Date	Consultee Stakeholder	Topic / receptor / site	Relevant jurisdiction	Issues Discussed / comment received	How and Where Considered in the RIAA
				Full justification is required for any rock, concrete or other protection to cables where burial is not possible. These justifications should clearly set out what other methods have been considered to reduce protection and why these are deemed unsatisfactory. Disturbance and displacement of seabirds and coastal shorebirds will need careful consideration. Similarly, these birds' supporting habitats will require thorough assessment. The coast at Cambois includes intertidal sand and sand dunes. There has been erosion of this area in the recent past and we advise that the impacts of increased storm events and sea level rise are considered within the ES.	through HRA Stage One Screening, which is documented in the HRA Stage One Screening Report (BBWFL, 2023a, included as Appendix 1) and this RIAA. The potential for adverse effects on site integrity to the Northumbria Coast SPA and Northumberland Coast RAMSAR is considered in section 2.5 of Part 2 of the RIAA The Marine Scheme ES includes assessments of a full range of identified potential impacts to all relevant receptors. This RIAA, details assessments of the potential impact pathways where LSE could not be ruled out as part of HRA Stage One Screening and subsequent consultation advice received (BBWFL, 2023a; NatureScot 2023a; Natural England, 2023).
Consultation on the Marine Scheme: HRA Screening					
10 May 2023	Northumberland County Council (NCC)	Northumbria Coast SPA/Ramsar	England	In table 7.3 (page 93-96) The qualifying features of the Northumbria Coast SPA / Ramsar and Northumberland Marine SPA (p94-95) have been reversed.	Noted and will be corrected in any further reference to these sites.
10 May 2023	Northumberland County Council (NCC)	Northumbria Coast SPA/Ramsar	England	Para 144: Agree that disturbance and / or displacement should be screened in for assessment in relation to the Northumbria Coast SPA / Ramsar and Northumberland Marine SPA.	Disturbance and displacement have been screened in for the assessment on this designated site as per section 5
10 May 2023	Northumberland County Council (NCC)	SPAs	England	Para 193: While noting the rationale for screening out impacts arising through direct habitat loss, this may need to be reconsidered as scheme design develops and should ongoing survey work (p.143) suggest that functionally linked land used by the qualifying features of the SPAs will be permanently lost to the development.	The potential for loss of functionally linked land has been greatly reduced by virtue of the Applicant's commitment to adopting trenchless technologies, such as HDD, for the Landfall. This RIAA is focused on the Marine Scheme. Since the circulation of the HRA Stage One

Date	Consultee Stakeholder	Topic / receptor / site	Relevant jurisdiction	Issues Discussed / comment received	How and Where Considered in the RIAA
					Screening Report (BBWFL, 2023a, included as Appendix 1), the Applicant has confirmed that a separate RIAA will be prepared and provided as part of the planning application for Onshore Scheme for submission to NCC– discussions are ongoing with NCC. It is anticipated that the planning application for the Onshore Scheme will be submitted Q4 2023. As part of the EIA for the Marine Scheme, the Applicant has carried out a detailed assessment on ornithology receptors, as reported in ES, Volume 2, Chapter 10: Offshore and intertidal ornithology. The potential for cumulative disturbance associated with the Marine Scheme and the Onshore Scheme is considered within this assessment (section 8.14.2 of ES, Volume 2, Chapter 10) as well as in the in-combination assessments presented in Part 2 of this RIAA.
05 May 2023	NatureScot: HRA Screening Response	Annex I Habitats	Scotland	We are content that no sites with Annex I habitat features are screened in within Scottish waters.	Noted and the Applicant confirms that no designated sites with Annex I habitats as qualifying features are included within this RIAA.
05 May 2023	NatureScot: HRA Screening Response	Diadromous Fish	Scotland	As previously advised in our response to the Marine Licence and Section 36 application for the proposed Berwick Bank offshore wind farm (issued 21 February 2023), we cannot advise on these species under the HRA process.	This is noted, however to ensure alignment with the assessment for English sites the Applicant has undertaken an assessment of Scottish sites designated for diadromous fish and freshwater pearl mussel.
05 May 2023	NatureScot: HRA Screening Response	Diadromous Fish	Scotland	Due to uncertainty on where migratory fish (Atlantic salmon, sea and river lamprey) go within marine waters and any connectivity back to natal	This is noted, however to ensure alignment with the assessment for English sites the Applicant has undertaken an assessment of Scottish sites

Date	Consultee Stakeholder	Topic / receptor / site	Relevant jurisdiction	Issues Discussed / comment received	How and Where Considered in the RIAA
				rivers, we consider these species should be assessed through EIA only and not through HRA.	designated for diadromous fish and freshwater pearl mussel.
05 May 2023	NatureScot: HRA Screening Response	Diadromous Fish	Scotland	For diadromous fish species, we do not have population data for any salmon or lamprey SAC on the data forms. This inability to understand connectivity between individual rivers and the development area currently prohibits an informed assessment of the actual impact on individual site integrity.	This is noted, however to ensure alignment with the assessment for English sites the Applicant has undertaken an assessment of Scottish sites designated for diadromous fish and freshwater pearl mussel.
05 May 2023	NatureScot: HRA Screening Response	Diadromous Fish	Scotland	We are aware of work being led by ScotMER on the Review of Evidence of Diadromous Fish, which is an area of research that may change conclusions on how diadromous fish are treated in both EIA and HRA going forward.	Noted
05 May 2023	NatureScot: HRA Screening Response	Ornithology	Scotland	**Identification of European sites and features** We are broadly content with the European sites identified in Section 5. However, there a few minor discrepancies as detailed below.	The Applicant has taken note of the discrepancies identified and where relevant updated the information presented.
05 May 2023	NatureScot: HRA Screening Response	Ornithology	Scotland	**Identification of European sites and features** Not all ornithology qualifying features were included in Table 5-1, for example, shag, Roseate tern and Sandwich tern are missing. Table 5-1 also incorrectly cites the mean maximum foraging range for Common tern, this should be 18 ± 8.9 km based on values from Woodward *et al*. (2019) – see also NatureScot Guidance Note 31. Additionally, the shag (breeding) qualifying feature is omitted from the Outer Firth of Forth and St Andrews Bay Complex SPA in Table 5-3.	The Applicant has taken note of the discrepancies identified and where relevant updated the information presented. Breeding shag, as a qualifying feature of the Outer Firth of Forth and St Andrews Bay Complex SPA, are assessed in section 2.9.21 of Part 2 of the RIAA.

Date	Consultee Stakeholder	Topic / receptor / site	Relevant jurisdiction	Issues Discussed / comment received	How and Where Considered in the RIAA
05 May 2023	NatureScot: HRA Screening Response	Ornithology	Scotland	**Identification of European sites and features** Paragraph 120 states that Manx shearwaters have low foraging density in the North Sea, however large concentrations of Manx shearwaters have been recorded within the Outer Firth of Forth and St Andrews Bay Complex SPA during the breeding season.	Noted, section 2.9.20 considers potential effects on manx shearwaters as qualifying features of the Outer Firth of Forth and St Andrews Bay Complex SPA.
05 May 2023	NatureScot: HRA Screening Response	Ornithology	Scotland	**Impact pathways and determination of Likely Significant Effect** We advise there are elements that require further consideration, concerning both the impacts proposed to be taken forward to the LSE determination stage (summarised in Table 6-5) and the consideration of LSE for project alone (Table 7-3) and in-combination effects (Table 8-2), as outlined below.	Noted.
05 May 2023	NatureScot: HRA Screening Response	Ornithology	Scotland	**Impact pathways and determination of Likely Significant Effect** Although for seabird species the assessment will use desk-based sources, there will be at least some of the area in Scottish waters that is covered by the aerial survey that has been undertaken to inform for the Berwick Bank project. The Cambois Connection should consider if any of this information is helpful in determining usage of the habitat within the cable corridor.	This Applicant can confirm that information from the BBWF aerial surveys have informed the assessment within this RIAA.
05 May 2023	NatureScot: HRA Screening Response	Ornithology	Scotland	**Disturbance and displacement** We note that disturbance and displacement is screened out during the O&M phase for all species. However, we advise that more detail is	Disturbance and displacement during O&M has been considered for all sites. Further information regarding the O&M phase, including the likely maintenance and repair activities

Date	Consultee Stakeholder	Topic / receptor / site	Relevant jurisdiction	Issues Discussed / comment received	How and Where Considered in the RIAA
				required on the likely maintenance and repair activities, including frequency and duration, before this can be screened out.	including frequency and duration are detailed in section 2.2.1 of Part 2 of the RIAA.
05 May 2023	NatureScot: HRA Screening Response	Ornithology	Scotland	**Disturbance and displacement** Further information should be presented, relating to size, number and operating speed of vessels, as well as potential vessel routes and period over which activity will take place within a localised vicinity. A qualitative assessment based on vessel movements and areas occupied by activity should be undertaken, as well as consideration for species sensitive to vessel disturbance.	Further information regarding vessel movements is provided in section 2.2.1 of Part 2 of the RIAA and has been considered within the assessment for SPAs.
05 May 2023	NatureScot: HRA Screening Response	Ornithology	Scotland	**Changes in prey availability** We welcome the consideration of disturbance from the Cambois Connection on important prey species and habitats of prey species in relation to seabirds. However, we disagree that the impact of temporary habitat loss or indirect effects on prey species is screened out. The changes to prey species availability from pre-construction activities that can emit significant underwater noise should also be considered further.	Changes in prey availability has been included within the assessment for SPAs.
05 May 2023	NatureScot: HRA Screening Response	Ornithology	Scotland	**Project alone effects** The Outer Firth of Forth and St Andrews Bay Complex SPA is the only site in Scottish waters to be screened in to the next stage of the HRA process.	As outlined below, the Applicant has now included Forth Islands SPA and St Abbs Head to East Castle SPA into the assessment for SPAs.
05 May 2023	NatureScot: HRA Screening Response	Ornithology	Scotland	**Project alone effects** However, there seems to be some inconsistency with how certain SPAs are treated during the	Noted.

Date	Consultee Stakeholder	Topic / receptor / site	Relevant jurisdiction	Issues Discussed / comment received	How and Where Considered in the RIAA
				screening process. For example, Northumbria Coast SPA in English waters has been screened in for all features under the Scottish scheme, despite this being beyond the recommended foraging ranges for certain seabirds.	
05 May 2023	NatureScot: HRA Screening Response	Ornithology	Scotland	**Project alone effects** In contrast, certain SPAs in Scottish waters with connectivity to the Cambois Connection have been screened out. Thus, we consider the following sites in Scottish waters have been screened out prematurely: Forth Islands SPA, and St Abb's Head to Fast Castle SPA The sites listed above should be screened in for vessel disturbance during construction and decommissioning. As indicated above, disturbance and displacement during the O&M phase and changes in prey availability should also be considered, including for the Outer Firth of Forth and St Andrews Bay Complex SPA.	The Applicant notes this guidance and has included Forth Islands SPA and St Abbs Head to East Castle SPA into the assessment for SPAs.
05 May 2023	NatureScot: HRA Screening Response	Ornithology	Scotland	**Project alone effects** We are content for Fowlsheugh SPA and Buchan Ness to Collieston Coast SPA to be screened out.	Noted and the Applicant confirms that Fowlsheugh SPA and Buchan Ness to Collieston Coast SPA have not been included for assessment within this RIAA.
05 May 2023	NatureScot: HRA Screening Response	Ornithology	Scotland	**In-combination effects** As above, we advise the following sites in Scottish waters are screened in for vessel disturbance and displacement across all phases for in-combination effects also:	The Applicant can confirm that vessel disturbance and displacement across all phases for in-combination effects has been screened in for the Outer Firth of Forth and St

Date	Consultee Stakeholder	Topic / receptor / site	Relevant jurisdiction	Issues Discussed / comment received	How and Where Considered in the RIAA
				Outer Firth of Forth and St Andrews Bay Complex SPA, Forth Islands SPA, and St Abb's Head to Fast Castle SPA	Andrews Bay Complex SPA, Forth Islands SPA, and St Abb's Head to Fast Castle SPA.
05 May 2023	NatureScot: HRA Screening Response	Ornithology	Scotland	**In-combination effects** We advise that changes in prey species availability for seabirds is also screened in for the sites listed above for in-combination effects. The scale of disturbance arising from the Berwick Bank offshore wind farm and Cambois Connection as a whole will be very large and therefore we cannot conclude no LSE due to in-combination effects.	The Applicant can confirm that changes in prey availability across all phases for in-combination effects has been screened in for the Outer Firth of Forth and St Andrews Bay Complex SPA, Forth Islands SPA, and St Abb's Head to Fast Castle SPA.
05 May 2023	NatureScot: HRA Screening Response	Marine Mammals	Scotland	**Identification of European sites and features** Although the Scottish portion of the proposed Cambois Connection is 35km from the Berwickshire and North Northumberland Coast SAC, the distance in English waters is only 18km. Thus, impacts from the proposed Cambois Connection could affect grey seals from the SAC population and we agree this site should be screened in.	The Berwickshire and North Northumberland Coast SAC has been assessed for potential adverse effects to site integrity for both English and Scottish waters.
05 May 2023	NatureScot: HRA Screening Response	Marine Mammals	Scotland	**Identification of European sites and features** We confirm that the River Tay SAC and the River Tweed SAC are screened out when considering the otter qualifying feature.	The Applicant notes this guidance and confirms that otter have not been included for assessment within This RIAA.
05 May 2023	NatureScot: HRA Screening Response	Marine Mammals	Scotland	**Identification of European sites and features** Advice from Natural England should be sought with respect to the Southern North Sea SAC, but	Advice from Natural England has been sought. As per HRA Screening Stage One (BBWFL, 2023a) and screening advice received from

Date	Consultee Stakeholder	Topic / receptor / site	Relevant jurisdiction	Issues Discussed / comment received	How and Where Considered in the RIAA
				we advise it should not be screened in with respect to activities in Scottish waters.	Natural England (Natural England , 2023a) an assessment for the potential for adverse effects to site integrity for the Southern North Sea SAC has been undertaken for English waters but not for Scottish waters (section 331).
05 May 2023	NatureScot: HRA Screening Response	Marine Mammals	Scotland	**Impact pathways and determination of Likely Significant Effect** We are content with the assessment of impact pathways in the LSE matrices (Table 7-2).	Noted and the Applicant confirms that the LSE pathways presented at HRA Screening Stage One have been utilised in the assessments presented in this RIAA.
05 May 2023	NatureScot: HRA Screening Response	General Advice	Scotland	NatureScot can provide further advice on natural heritage interests, at appropriate stages, as work is undertaken by the applicant in support of their formal submission.	Noted and the Applicant welcomes the opportunity to discuss the Marine Scheme as the project develops.
18 May 2023	Natural England: HRA Screening Response	Benthic Ecology	England	*Section 106 Benthic Zone of Influence (ZoI)* We advise that a benthic ZoI should be related to a tidal cycle. This is likely to be different in different places ie areas with fast tides will have a large ZoI whereas areas with slower tides will have smaller ZoIs. This is to ensure that sites and features are appropriately screened and assessed for pressures. An example is sediment deposition: very fine muds that are suspended due to works can travel large distances with fast tides. For this current HRA screening, we don't consider that this will change the conclusions. This advice may be of use when developing the Report to Inform Appropriate Assessment and MCZ assessments for benthic habitats.	The Applicant has considered this advice when assessing the need to consider designated sites with Annex I habitats as qualifying features. It does not change the conclusion presented at HRA Screening Stage One (BBWFL, 2023a) in that there is no LSE anticipated for any designated sites with Annex I habitats based on the separation distances from the Marine Scheme and the nature of the designated Annex I habitats at the closest sites which have been considered. Therefore, there is no consideration of these sites as part of the RIAA.
18 May 2023	Natural England: HRA Screening Response	Migratory Fish	England	*Table 6-3.*	The Applicant can confirm that where relevant EMF has been considered as a potential impact pathway for diadromous fish.

Date	Consultee Stakeholder	Topic / receptor / site	Relevant jurisdiction	Issues Discussed / comment received	How and Where Considered in the RIAA
				We welcome the inclusion of Electromagnetic Field Emissions (EMFs) which we advised in previous discussions.	
18 May 2023	Natural England: HRA Screening Response	Migratory Fish	England	We agree with the conclusion of potential LSE for EMF to be taken to appropriate assessment for Tweed Estuary SAC and River Tweed SAC.	The Applicant can confirm that an assessment of EMF on the qualifying features of the Tweed River and Tweed Estuary SAC has been carried out (section 7.3).
18 May 2023	Natural England: HRA Screening Response	Marine Mammals	England	*Table 6-4.* We agree with the conclusion of potential LSE for Underwater noise to be taken to appropriate assessment for Berwickshire and North Northumberland Coast SAC and Southern North Sea SAC.	The Applicant can confirm that underwater noise as part of preinstallation surveys has been assessed for the qualifying features of the Berwick Bank and Southern North Sea SACs (section 331).
18 May /2023	Natural England: HRA Screening Response	Ornithology	England	**Teesmouth and Cleveland Coast Ramsar site** The Teesmouth and Cleveland Coast Ramsar is designated for: Knot (Calidris canutus islandica) – wintering Redshank (Tringa tetanus) – passage Sandwich tern (Thalasseus sandvicensis) – passage Waterbird assemblage – wintering.	Noted, these species have been assessed within section 2.3 of Part 2 of the RIAA as qualifying feature of the Teesmouth and Cleveland Coast SPA.
18 May 2023	Natural England: HRA Screening Response	Ornithology	England	The provisions on the Habitats Regulations relating to Habitat Regulations Assessments (HRAs) extend to Ramsar sites (paragraph 181 of National Planning Policy Framework). For completeness we advise this included alongside the SPA in an addendum to the HRA screening report.	The Applicant has agreed with Natural England to provide an updated revision of the HRA Stage One Screening Report to be submitted alongside the RIAA. This updated report includes details of the Ramsar site as requested and can be found in Appendix 1.

Date	Consultee Stakeholder	Topic / receptor / site	Relevant jurisdiction	Issues Discussed / comment received	How and Where Considered in the RIAA
18 May 2023	Natural England: HRA Screening Response	Ornithology	England	Natural England considers the Conservation Advice packages for the overlapping European Marine Site designations to be, in most cases, sufficient to support the management of the Ramsar interests. Therefore, this site does not have its own conservation advice package as this is covered under the Teesmouth and Cleveland Coast SPA.	Noted
18 May 2023	Natural England: HRA Screening Response	Ornithology	England	**Teesmouth and Cleveland Coast SPA** The Teesmouth and Cleveland Coast SPA is designated for the following features: Avocet (*Recurvirostra avosetta*) – Breeding Common tern (*Sterna hirundo*) – Breeding Knot (*Calidris canutus*) – Non-breeding Little tern (*Sternula albifrons*) – Breeding Redshank (*Tringa 56etanus*) – Non-breeding Ruff (*Calidris pugnax*) – Non-breeding Sandwich tern (*Thalasseus sandvicensis*) – Non-breeding Waterbird assemblage – Non-breeding Avocet, knot and ruff appear to have been omitted from the HRA screening.	Noted, these species have been assessed within section 2.3 of Part 2 of the RIAA as qualifying feature of the Teesmouth and Cleveland Coast SPA. As outlined above the HRA screening has been updated to include avocet, knot and ruff (Appendix 1).
18 May /2023	Natural England: HRA Screening Response	Ornithology	England	Table 7-3 appears to not include a conclusion for the assessment of LSE for Teesmouth and Cleveland Coast. We advise that this is clarified in an addendum.	This information is now included in an updated revision of the HRA Stage One Screening Report which can be found in Appendix 2.

Date	Consultee Stakeholder	Topic / receptor / site	Relevant jurisdiction	Issues Discussed / comment received	How and Where Considered in the RIAA
18 May 2023	Natural England: HRA Screening Response	Ornithology	England	We advise that avocet, knot and ruff are included and assessed in an addendum to the HRA screening report.	This information is now included in an updated revision of the HRA Stage One Screening Report which can be found in Appendix 2.
18 May 2023	Natural England: HRA Screening Response	Ornithology	England	*Long term habitat loss in operation phase* Section 6.2.2.1 heading and paragraph 190 appear to contradict each other. We would welcome clarity on whether this section relates to onshore works, offshore or both.	This should refer to the Onshore Scheme only and the document has been updated to reflect this.
18 May 2023	Natural England: HRA Screening Response	Ornithology	England	*Long term habitat loss in operation phase* In the marine environment, the cable may require protection (eg concrete mattresses or rock armouring) leading to long term or permanent habitat loss. The cable passes through Northumberland Marine SPA and close to Northumbria Coast SPA. The birds of these designated sites feed in intertidal and nearshore areas. We advise that long-term habitat loss is assessed for the English Marine Scheme.	Long-term habitat loss is assessed for both the Northumberland Marine SPA and Northumbria Coast SPA as outlined in sections 2.5 and 2.4 respectively.
18 May 2023	Natural England: HRA Screening Response	Ornithology	England	**Onshore Scheme** We agree with the conclusions of potential LSE for the onshore scheme.	Noted
18 May 2023	Natural England: HRA Screening Response	Ornithology	England	**In-combination effects** We advise that long-term habitat loss should be assessed in-combination with other projects.	Long-term habitat loss is assessed in-combination for both the Northumberland Marine SPA and Northumbria Coast SPA as outlined in sections 2.5 and 2.4 respectively.
18 May 2023	Natural England: HRA Screening Response	Ornithology	England	**In-combination effects** Otherwise, Natural England advise that, to the best of our knowledge, sufficient detail has been	Noted. The MMO were consulted on HRA screening but deferred consultation to Natural England.

Date	Consultee Stakeholder	Topic / receptor / site	Relevant jurisdiction	Issues Discussed / comment received	How and Where Considered in the RIAA
				provided regarding other projects and potential pathways screened in for in-combination effects and agree with the conclusion of no LSE. Therefore, Natural England have no further comments at this time. However, we advise that you obtain advice from the Marine Management Organisation who may be aware of other projects to consider in the area.	

5. Overview of HRA Screening

5.1. Identification of European Sites and Features with Connectivity to the Marine Scheme

111. The European sites considered in this RIAA are those for which LSE has been identified or cannot be ruled out, following HRA Screening Stage 1 and taking account screening advice from NatureScot and Natural England.

112. Identification of these sites was completed in line with the following process:

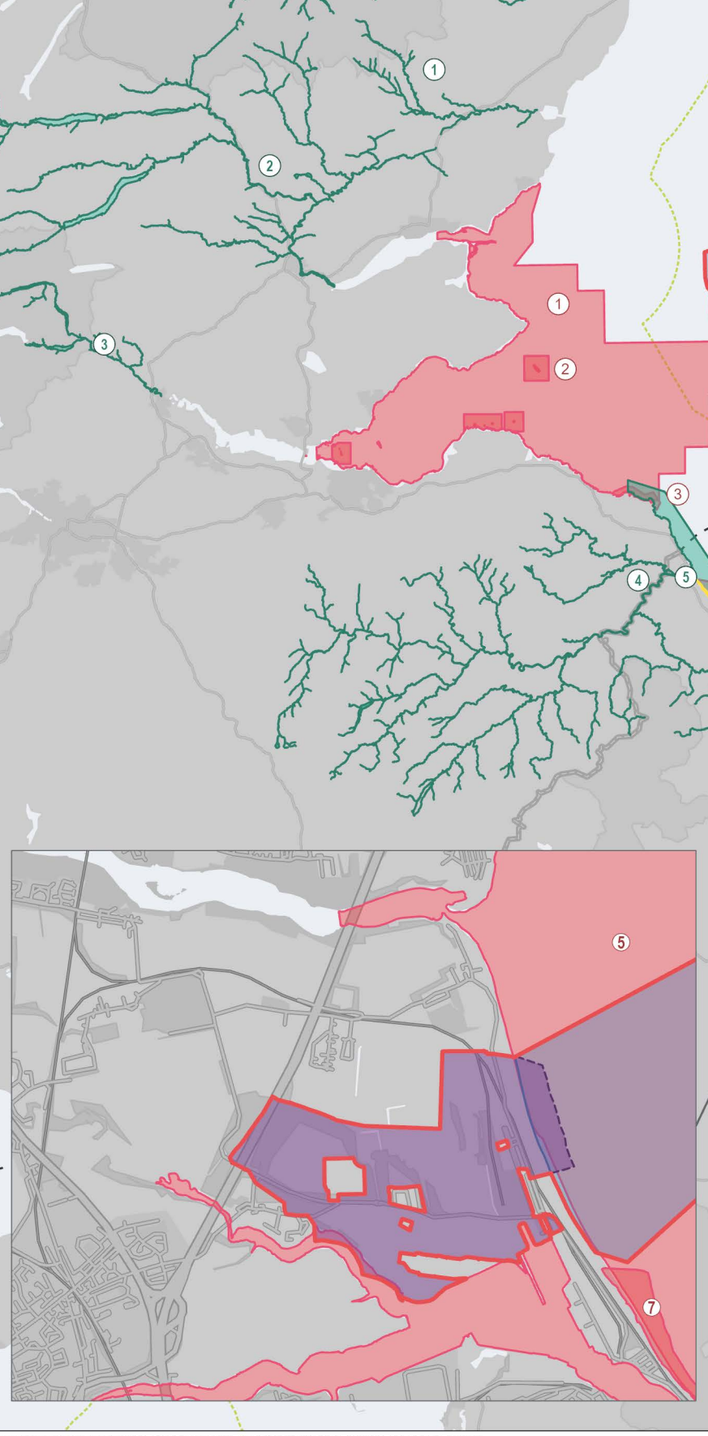
- Identification of the range of potential effects of the Marine Scheme on a designated site, its qualifying features and conservation objectives and the identification of any potential pathways for LSE; and
- A determination of the potential connectivity of these designated sites with the Marine Scheme. Connectivity can occur:
  - Where the European site overlaps with the Marine Scheme.
  - Where mobile species can move outwith the designated site – due to migration or foraging, for example – and still be impacted by the Marine Scheme.

113. Figure 2 below provides an overview of the European sites considered in this RIAA.

400000 500000 600000 700000 800000

6300000 6200000 6100000 6000000

Scotland
England



Legend

- Cambois Connection
- Onshore Scheme Boundary
- Marine Scheme Boundary
- SPA (Special Protection Area)
- UK 12 Nautical Mile Limit
- Scotland/England Territorial Waters
- EEZ Boundary

1. Outer Firth of Forth and St Andrews Bay Complex
2. Forth Islands
3. St Abb's Head to Fast Castle
4. Farne Islands
5. Northumberland Marine
6. Coquet Island
7. Northumberland Coast
8. Teesmouth and Cleveland Coast

SAC (Special Area of Conservation)

1. River South Esk
2. River Tay
3. River Teith
4. River Tweed
5. Tweed Estuary
6. Berwickshire & North Northumberland Coast
7. Southern North Sea
8. River Dee

Ramsar

Rev	Date	Status	Drwn	Chkd	Appd
04	-	-	-	-	-
03	-	-	-	-	-
02	14/07/2023	Revised	TF	JO	EW
01	07/06/2023	Issued	DS	AMB	EW

sse Renewables

Project

Cambois Connection

Title

Figure 2: European Sites Assessed as part of the RIAA

0 5 10 20 30 40 nm

0 50 100 km

N

Scale	Plot Size	Datum	Projection
1:1,400,000	A3	WGS84	UTM30N

Drawing Number: A100796_S01_HRA_02

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5.2. Transboundary Effects

114. As part of HRA screening assessment, the potential for transboundary effects was considered. The nature of the Marine Scheme means that the ZOIs are highly limited. The only aspect of the Marine Scheme which could foreseeably have the potential for any form of transboundary effect the maximum ZOI is ~ 5 km (an initial highly precautionary estimate used to inform the consideration of underwater noise).

115. Published governmental guidance recognises that the potential for transboundary effects is usually anticipated in the case of generating stations and specifically, large-scale offshore wind developments (DECC, 2015; The Planning Inspectorate, 2022). The Marine Scheme does not include any generating assets and will not give rise to activities which could foreseeably lead to a transboundary effect in all phases of development.

116. The HRA screening assessment undertaken by the Applicant for the BBWF considered the potential for transboundary effects on 19 transboundary sites (BBWFL, 2023a). The BBWF HRA screening assessment concluded that for all of the 19 transboundary sites considered, all relevant effect-pathways were extremely weak, such that only negligible (if even detectable) effects would be apparent. As a confirmatory exercise, the 19 sites were all re-reviewed by the Applicant for the Project and owing to the limited suite of potential impacts associated with the Project and the factors described above, no transboundary effects were identified either for the Project alone or in-combination with other projects and plans. On this basis, transboundary effects were not considered further at HRA Screening Stage One (BBWFL, 2023a) and will not be considered further for the Marine Scheme in this RIAA.

5.3. Determination of No Likely Significant Effects

117. Where a potential pathway for LSE between the Marine Scheme and a designated site was identified through HRA Screening Stage 1, further assessment of the potential impacts could still result in a conclusion of no LSE. The determination of no LSE was concluded based upon:

118. The qualifying feature(s) would, as a result of their foraging, behavioural, breeding or migratory characteristics, be determined as having limited sensitivity to the activities proposed as part of the Marine Scheme (e.g. the Marine Scheme and associated activities are outwith the foraging range of a particular qualifying bird species); and/or

119. The qualifying feature(s) or species of interest are likely to be affected by activities proposed as part of the Marine Scheme, however the impacts are considered inconsequential such that the conservation objectives for the site's qualifying interest features would not be undermined

120. The assessment of no LSE considered the effect pathway and the nature of the qualifying feature(s) or species. Where it concluded that there is no potential for LSE on a designated site, its qualifying features or conservation objectives, the designated site was screened out for further assessment in this RIAA.

121. The full LSE Screening Report (BBWFL, 2023a) accompanies this RIAA as Appendix 1.

5.4. HRA Screening Conclusions

122. The HRA Stage One Screening Report (BBWFL, 2023a) identified five SACs designated for diadromous fish where LSE could not be ruled out for the Marine Scheme. Whilst noting HRA Screening advice from NatureScot (NatureScot, 2023b) all five sites have been included within this RIAA (River Tay SAC, River Teith SAC, River South Esk SAC, Tweed Estuary SAC and the River

Tweed SAC), an additional sixth site, the River Dee SAC was subsequently included after the screening process. The Tweed Estuary SAC is wholly located in English waters, while the River Tweed SAC spans both Scotland and England, the remaining sites are wholly located in Scottish waters. Two SACs designated for marine mammal features were identified where LSE could not be ruled out for the Marine Scheme. These sites were confirmed in the HRA Screening advice that was received, however NatureScot indicated the Southern North Sea SAC (designated for harbour porpoise) does not need to be assessed for Scottish waters. Therefore, it will only be assessed for English waters. The Berwickshire and North Northumberland Coast SAC (designated for grey seals) will be assessed for English and Scottish waters. No SACs designated for Annex I habitats were identified for assessment through HRA Screening Stage One, this was supported by Screening Advice received from NatureScot and Natural England (NatureScot 2023b and Natural England, 2023a).

123. Five SPAs were identified through HRA Screening Stage One. Following receipt of Screening advice (NatureScot, 2023b and Natural England, 2023a) this increased to eight. These include Teesmouth and Cleveland Coast SPA, Northumbria Coast SPA/Ramsar Site, Northumberland Marine SPA, Coquet Island SPA, Farne Islands SPA, St Abb's Head to Fast Castle SPA, Outer Firth of Forth and St Andrews Bay Complex SPA and Forth Islands SPA. The assessment of SPAs can be found in Part 2 of the RIAA. Figure 2 and Table 5 detail which sites which have been taken forward for assessment in the RIAA.

Table 5 Site summaries and LSE based on HRA Screening Stage One and Screening Responses

Receptor	Description/Information	Site	Scottish Marine Scheme	English Marine Scheme
European sites designated for **Annex I habitats**	HRA Screening Stage1: There are no European sites with relevant Annex I habitats that have a connectivity to the Marine Scheme. Due to the distance to these sites (i.e. all sites are located > 2 km from the Marine Scheme, which is considered as the ZOI for potential LSE, based on likely impact pathways including habitat loss, increases in suspended sediments, removal of hard substrate). Therefore, no potential LSE was concluded for European sites designated for Annex I habitats and this receptor is not taken forward for assessment within this RIAA. During HRA consultation, Natural England requested that Durham Coast SAC (designated for vegetated sea cliffs) was considered as part of HRA Screening. Following consideration of potential pathways for LSE on Annex 1 habitats within the SAC and the ZOI, it was concluded that there are no pathways for potential LSE from the Project on Durham Coast SAC. This is based on the lack of connectivity associated with the planned Marine Scheme activities as well as the nature of the qualifying feature i.e. cliff and the distance between the SAC and the Marine Scheme (approximately 20 km, meaning significantly outside of the determined ZOI). It was therefore **screened out of further consideration at HRA Screening Stage 1 and will therefore not be considered in this RIAA**. Screening Responses (see section 4) Screening advice from NatureScot supports this approach. Natural England do not offer further advice on Durham Coast SAC in the Screening advice, so it is assumed they are content with the assessment presented in the Screening Report which screens the site out. Screening advice from Natural England provided additional information on the ZOI for benthic ecology, this information does not change the conclusion of HRA Screening or	NA	x	x

Receptor	Description/Information	Site	Scottish Marine Scheme	English Marine Scheme
	require any European sites designated for Annex I habitats to be considered in this RIAA. **Scoped out for further consideration in this RIAA as LSE ruled out**			
European sites designated for **diadromous fish** and associated features	<u>HRA Screening Stage 1:</u> Connectivity with six SACs designated for diadromous fish species and connectivity with one site where diadromous fish and freshwater pearl mussel (*Margaritifera margaritifera)* are qualifying features. Brook lamprey (*Lampetra planeri*) is a qualifying feature of the River Tweed SAC and the River Teith SAC, this species is solely a freshwater species so was ruled out of consideration at HRA Screening Stage 1 due to the absence of impact pathway. Brook lamprey will not be considered any further in this RIAA. The diadromous species for which LSE could not be ruled out are Atlantic salmon, sea lamprey (*Petromyzon marinus)* and river lamprey (*Lamptera fluviatilis*). <u>Screening Responses (see section 4)</u> Screening advice received from NatureScot states that they are unable to comment on diadromous fish as part of the HRA process due to lack of certainty regarding where migratory fish go within the marine environment. For this reason, NatureScot state that these species should only be assessed through the EIA and not through HRA. However, to ensure a consistent approach with the assessment of sites in English waters the Applicant has included Scottish sites within the assessment, the sites include River Tay SAC, River Teith SAC, River South Esk SAC, and River Dee SAC for Atlantic salmon. Freshwater pearl mussel are dependent on Atlantic salmon for a parasitic stage of their life cycle. The species is a qualifying feature of the River South Esk SAC and River Dee SAC, and therefore has been included within the assessment. Screening advice from Natural England supports the conclusion of the potential to LSE for the Tweed Estuary SAC and River Tweed SAC.	**Scottish Sites**		
		River Tay SAC	✓	✓
		River Teith SAC	✓	✓
		River South Esk SAC	✓	✓
		River Dee SAC	✓	✓
		Sites which occur in both Scotland and England		
		River Tweed SAC	✓	✓
		English sites		
		Tweed Estuary SAC	✓	✓

Receptor	Description/Information	Site	Scottish Marine Scheme	English Marine Scheme
	Scoped in for further consideration in this RIAA as LSE could not be ruled out. **The only pathway screened in for assessment is EMF during the operations and maintenance phase of the Marine Scheme.**			
European sites designated for **marine mammal** features	<u>HRA Screening Stage 1:</u> Connectivity with two SACs designated for marine mammals. Berwickshire and Northumberland Coast SAC for grey seal (*Halichoerus grypus*) and Southern North Sea SAC for harbour porpoise (*Phocoena phocoena*) Otter (*Lutra lutra*) are a qualifying feature of the River Tweed SAC. There is no impact pathway for this species as a result of the Marine Scheme, for this reason otter was ruled out of consideration at HRA Screening Stage 1 and will not be given further consideration in this RIAA. <u>Screening Responses (see section 4):</u> Screening advice received from NatureScot agrees on the lack of requirement to screen in otter species to the RIAA. Advice also supports the finding of potential LSE for the Berwickshire and North Northumberland SAC and therefore requirement for consideration in the RIAA. NatureScot also advise that the Southern North Sea SAC does not require to be screened in for Scotland. Screening advice from Natural England supports the conclusions of HRA Screening Stage 1. **Scoped in for further consideration in this RIAA as LSE could not be ruled out.** **The only pathway screened in for assessment is underwater noise during pre-installation surveys.**	**Scottish sites**		
		Berwickshire and North Northumberl and Coast SAC	✓	✓
		English sites		
		Southern North Sea SAC	×	✓
European sites designated for **ornithology** features	<u>HRA Screening Stage 1:</u> Connectivity with six SPAs was reported at HRA Screening Stage 1. <u>Screening Responses (see section 4):</u>	**Scottish sites**		
		Forth Islands SPA	✓	✓

Receptor	Description/Information	Site	Scottish Marine Scheme	English Marine Scheme
	Screening advice from NatureScot Screening advice received from NatureScot states that they broadly agree with the sites screened in for ornithology. However they thought the following sites had been prematurely screened out: • Forth Islands SPA, and • St Abb's Head to Fast Castle SPA. Therefore, these sites will be screened into the RIAA, taking the total number of SPAs for assessment to eight. Screening advice received form Natural England states that Teesmouth and Cleveland Coast Ramsar site is considered as part of an HRA Screening Addendum. **Scoped in for further consideration in this RIAA as LSE could not be ruled out.** **The pathways screened in for assessment are vessel disturbance for all sites and vessel disturbance and nearshore construction works for the Northumberland Coast SPA.**	St Abb's Head to Fast Castle SPA	✓	✓
		Firth of Forth and Site Andrews Bay Complex SPA	✓	✓
		Farne Islands SPA	✓	✓
		English sites		
		Teesmouth and Cleveland Coast SPA	×	✓
		Coquet Island SPA	✓	✓
		Northumberland Coast SPA/Ramsar	✓	✓
		Northumberland Marine SPA	✓	✓

6. Approach to the RIAA

6.1. Impact Assessment Methodology

124. This RIAA has been carried out with reference to the general EC guidance on HRA (European Commission, 2001), general guidance on HRA published by the UK Government in 2021 (Department for Environment, Food & Rural Affairs, Natural England, Welsh Government, and Natural Resources Wales, 2021). This assessment also considers guidance from both MD-LOT and the MMO.

125. Although the Marine Scheme is not subject to the Planning Act 2008 and will not be consented through a Development Consent Order as explained above, the sequential stages set out in the Planning Inspectorate (PINS) Advice Note 10 ('AN10') (The Planning Inspectorate, 2017) and summarised earlier in this document can be applied to any project.

126. Appreciating that the Marine Scheme is not an NSIP, the approach detailed within AN10 has been followed voluntarily to help inform the process.

127. Where the screening process detailed within the HRA Stage One Screening Report concluded 'No LSE' and this was agreed with stakeholders, these European sites have not been subject to any further assessment, as is summarised above. Where the HRA Stage One Screening Report identified that it would *not* be possible to reach a conclusion of 'no LSE', this RIAA provides the information required to carry out an Appropriate Assessment. Where stakeholders did not agree with a conclusion during consultation on the HRA Stage One Screening Report, relevant European sites and pathways have been taken forward for inclusion in the RIAA.

128. Case law has clarified that 'Appropriate Assessment' is not a prescribed technical term pertaining to a specifically defined Scope of appraisal on European sites (the Appropriate Assessment constitutes whatever level of further assessment is required to determine whether an adverse effect on integrity would arise).

129. Further to the information provided regarding case law in section 3.4.5 above, in 2018 the Holohan ruling was handed down by the European Court of Justice (("Brian Holohan and Others v An Bord Pleanála"). Among other inclusions, the ruling states that '*As regards other habitat types or species, which are present on the site, but for which that site has not been listed, and with respect to habitat types and species located outside that site* […] *typical habitats or species must be included in the Appropriate Assessment, if they are necessary to the conservation of the habitat types and species listed for the protected area'* [emphasis added]. Further to the discussion related to functional linkage in the HRA Stage One Screening Report (BBWFL, 2023b, included as Appendix 1) this ruling has been considered in relation to the Marine Scheme.

130. The case law, legislation and policy and guidance detailed above have all been used to inform the RIAA, alongside the consultation and engagement reported above.

6.2. Structure of the Assessment

131. For each assessment included in this RIAA, an overview of the relevant HRA Stage One Screening will be provided, along with any additional information received through screening consultation. A baseline description of relevant qualifying features and designated sites will be provided followed by an assessment of impacts with the potential to have an adverse impact on site integrity. Assessments have been carried out for both the Marine Scheme alone and acting in combination with other relevant projects and plans.

132. Each assessment is structured around the following sub-sections:

- Introduction
- Assessment information
  - Maximum Design Scenarios
  - Measured Adopted as Part of Marine Plan
  - Species accounts
- Assessment of Adverse Effect on Site Integrity
  - European Site Information
  - Conservation Objectives
  - Feature and Effects Requiring Assessment
  - Project Alone Assessment
  - Conclusions - Project Alone Assessment
  - Other Developments Requiring Consideration
  - In-Combination Assessment

6.3. Approach to In-Combination Assessments

6.3.1. Overview

133. This section outlines the approach to the in-combination assessment of other projects or plans within the marine environment along with the Marine Scheme.

134. It is a requirement under the Habitats Regulations, that the potential impacts of a project are not only considered alone but are assessed in-combination with other plans and projects.

6.3.2. HRA Stage One Screening

135. The European Sites that have been taken forward for the RIAA stage of HRA will be assessed for in-combination effects within this report. As part of HRA Screening Stage One, European Sites which were screened out for assessment of LSE from the Project alone underwent assessment to identify the potential of LSE from in-combination effects, considering pathways that were determined reasonably possible from the identified in-combination projects. It was concluded that no additional pathways or European Sites required in-combination assessment as part of the RIAA, beyond those identified for project alone assessment.

136. The pathways taken forward for in-combination LSE assessment were identified based on professional judgement of comparable infrastructure development experience; in accordance with the HRA Principles (UK Government, 2021), the assessment considered all possible effects associated with the Marine Scheme, reaching judgments based on the facts of the Marine Scheme and existing baseline environment whilst using the best available objective and scientific information to make robust judgments. Whilst appreciating that the Marine Scheme is not an NSIP, the Applicant is cognisant of the well-established HRA guidance available for development under the Planning Act 2008 and this was also used to inform the assessment of potential pathways (The Planning Inspectorate, 2022); this included thorough pre-application engagement with SNCBs prior to submission of the assessment. The overall aim is to present a proportionate assessment of LSE based on the nature, location and scale of the Marine Scheme to identify those receptors and European Sites which have the potential to experience in-combination effects.

6.3.3. RIAA In-Combination Assessments

137. The HRA Screening Stage One (BBWFL, 2023) was used to inform the projects included for consideration of in-combination impacts within this RIAA. Note was also taken of any in-combination advice received as part of the HRA Screening Responses from NatureScot and Natural England (NatureScot, 2023b; Natural England, 2023a). Additionally, the approach taken for the assessment of in-combination impacts for the RIAA has been informed by the cumulative effects assessment (CEA) carried out for relevant topics in the Marine Scheme ES. The CEA methodology is described in detail in ES, Volume 2, Chapter 3: EIA Methodology (summarised below).

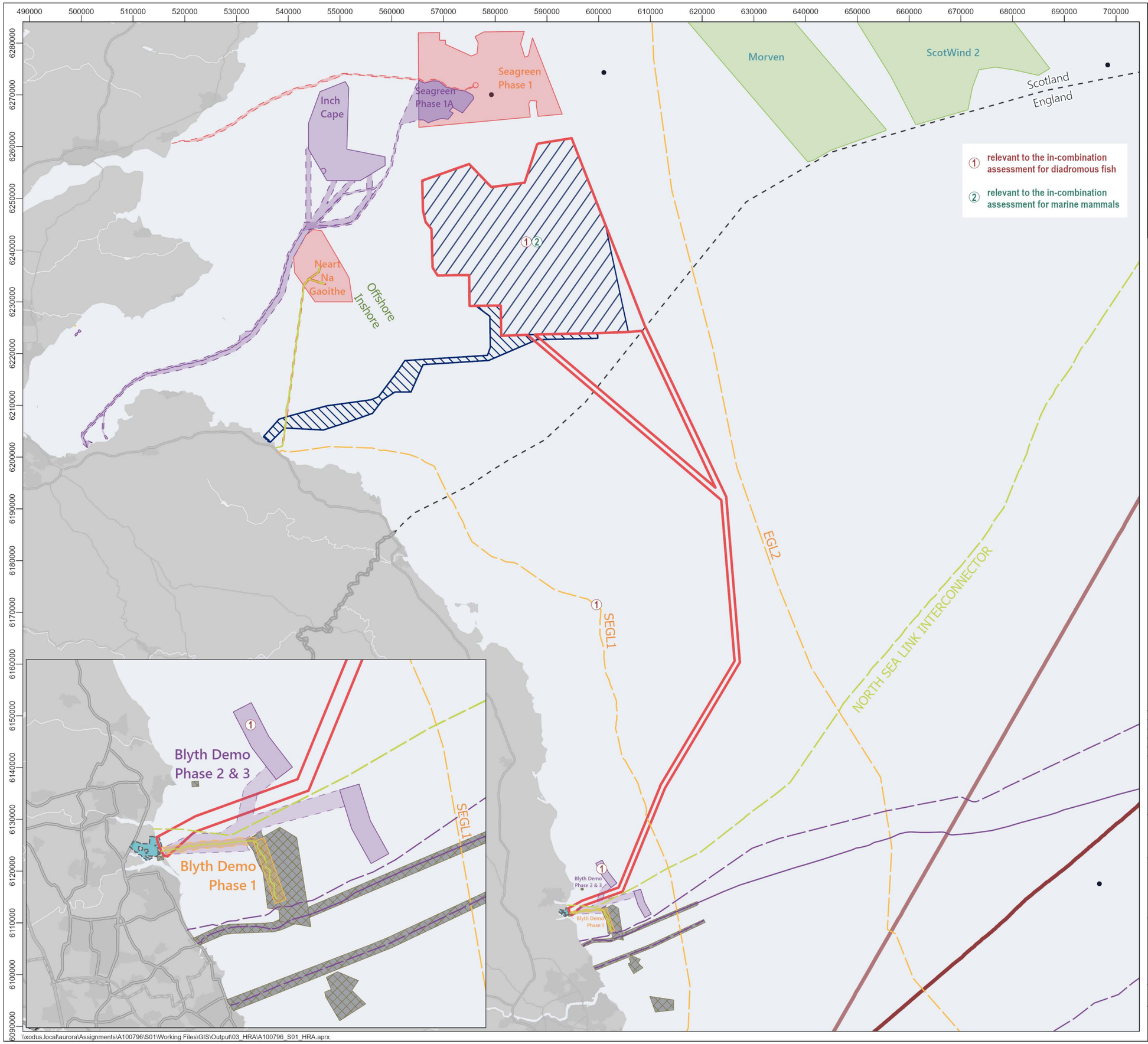
138. The Marine Scotland Consenting and Licensing Guidance: For Offshore Wind, Wave and Tidal Energy Applications (Scottish Government, 2018) states that 'Engagement with MD-LOT is required to identify which plans/projects/ongoing activities should be included in the in-combination element of the cumulative effects assessment.'. Whilst no such explicit advice is provided by the MMO for the north-east coast, their overarching impact assessment guidance (MMO, 2014) and the advice received during the pre-application period, as outlined above, has been used to inform the in-combination assessments. In line with Marine Scotland guidance, the offshore wind projects in the Firth of Forth and Tay region have been considered. In both Scottish and English waters, a range of other developments have been considered, including those with consent and submitted but not yet determined and those projects with a Scoping Report. In addition, plans and projects which are "reasonably foreseeable" (i.e., developments that are being planned, including, for example, offshore renewable energy projects which have a Crown Estate Agreement for Lease) have been considered where possible to do so based on the information available. There is no single, agreed approach to the completion of a CEA however, as agreed as part of the Scoping process, the following guidance has been used to help inform the approach to the assessment of in-combination effects:

- Cumulative Effects Assessment (PINS, 2019) provides guidance on the assessment of cumulative effects relevant to Nationally Significant Infrastructure Projects (NSIPs). Whilst the Marine Scheme is not an NSIP, the well-tested and robust methodology is valuable;
- A strategic Framework for Scoping Cumulative Effects (MMO, 2014) provides guidance for the assessment of cumulative effects within the marine environment; and
- Marine Scotland (2018) Offshore wind, wave and tidal energy applications: consenting and licensing manual.

139. The in-combination assessment has considered all other relevant plans, projects and activities where detail to inform the assessment is publicly available three months prior to the Marine Licence Application for the Marine Scheme, i.e. 30th April 2023 An overview of the projects or activities which will be considered for in-combination with the Marine Scheme includes:

- Cambois Connection Onshore Scheme;
- Berwick Bank Wind Farm offshore elements;
- Other offshore wind farms and associated cabling and infrastructure;
- Oil and gas infrastructure/development (cables and pipelines);
- Other forms of cabling (i.e. telecommunications and interlinks); and
- Other coastal energy and/or miscellaneous coastal development activity.

140. Where information is provided to inform Appropriate Assessment below, an in-combination assessment is provided for each relevant European site / feature(s).



Legend

- Marine Scheme Boundary
- Onshore Scheme Boundary
- Berwick Bank Wind Farm Array Area
- Berwick Bank Wind Farm Branxton Connection

Offshore Wind Farm Site Agreements

- Active/In Operation
- Under Construction
- Consented
- Pre Planning

Offshore Wind Farm Site Cable Corridors

- Active/In Operation
- Under Construction
- Consented

- Telecom (Active)
- Power (Active)
- Power (Consented/ Planned)
- Pipeline
- Well
- Scotland/England Territorial Waters

Rev	Date	Status	Drwn	Chkd	Appd
04	-	-	-	-	-
03	-	-	-	-	-
02	11/07/2023	Revised	TF	JO	EW
01	07/06/2023	Issued	DS	AMB	EW

sse Renewables

Project

Cambois Connection

Title

Figure 3 Projects and Plans for Consideration as part of RIAA In-Combination Assessments

0 2.5 5 10 15 20 nm

0 2.5 5 10 15 20 25 30 km

N

Scale	Plot Size	Datum	Projection
1:700,000	A3	WGS84	UTM30N

Drawing Number: A100796_S01_HRA_03

Sheet No.: 001 OF 001

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7. Appraisal of Adverse Effects on Site Integrity – SACs designated for Diadromous Fish

7.1. Introduction

141. This section provides an assessment of the potential adverse effects from the Marine Scheme on SACs designated for the conservation of diadromous fish and freshwater pearl mussel which have been screened into the assessment. Screening in was based on the conclusions of the HRA Stage One Screening Report (BBWFL, 2023a) and subsequent screening advice received from NatureScot and Natural England (NatureScot, 2023b; Natural England 2023a). Qualifying diadromous fish species screened into this assessment are Atlantic salmon (*Salmo salar)*, river lamprey (*Lampetra fluviatiles)* and sea lamprey (*Petromyzon marinus)*.

142. Atlantic salmon are a host species for freshwater pearl mussels during a critical parasitic phase of the mussel's lifecycle, therefore this species has the potential to be indirectly affected, if the Marine Scheme impacts Atlantic salmon. Relevant SACs where freshwater pearl mussel is a qualifying species are the River South Esk and the River Dee both of which are located in Scotland.

143. The Cambois Marine Scheme ES (BBWFL, 2023b) includes a full assessment of potential impacts to diadromous fish species and should therefore be referred to in this regard; please see ES, Volume 2, Chapter 9: Fish and Shellfish Ecology for further information. Of particular relevance are the following sections of that chapter:

- Section 9.7: Baseline Environment;
- Section 9.12: Assessment of Impacts; and
- Section 9.14: Cumulative Effects.

144. Whilst it is recognised that the HRA process is separate to the EIA process. It is considered that these sections of the ES present useful information in presenting baseline information on the qualifying species of interest for the RIAA. Where relevant the impact assessments presented in the ES, have been consulted as some represent the impact pathways identified for consideration in the RIAA. Reference to the ES is not intended to fulfil an information source for this RIAA, rather the information presented should be considered complementary.

145. Table 6 presents the SACs with diadromous fish as qualifying features that have been screened into this RIAA.

Table 6 European sites designated for diadromous fish and associated features being considered within the RIAA

SAC	Qualifying feature/s (only those features for consideration in the RIAA are listed)	Distance to the Marine Scheme in Scottish Waters	Distance to the Marine Scheme in English Waters
River Tay	• Atlantic salmon • River lamprey • Sea lamprey	61 km	109 km
River Teith	• Atlantic salmon • River lamprey • Sea lamprey	127 km	157 km
River South Esk	• Atlantic salmon • Freshwater pearl mussel	50 km	101 km
River Dee	• Atlantic salmon • Freshwater pearl mussel	71 km	120 km
Tweed Estuary	• River lamprey • Sea lamprey	46 km	40 km
River Tweed	• Atlantic salmon • River lamprey • Sea lamprey	48 km	40 km

7.2. Assessment Information

146. The impact pathways for which potential LSE could not be ruled out are presented in Table 7. These pathways were supported by screening advice received from Natural England (Natural England, 2023a).

Table 7 Impact pathways screened into the RIAA for diadromous fish and associated features

Receptor	Marine Scheme stage Construction (C) Operation and Maintenance (O&M) Decommissioning (D)	Potential pathway	Scottish Marine Scheme	English Marine Scheme
Atlantic salmon	O&M	EMF	✓	✓
Sea lamprey	O&M	EMF	✓	✓
River lamprey	O&M	EMF	✓	✓
Freshwater pearl mussel	O&M	EMF	✓	✓

7.2.1. Maximum Design Scenarios

147. The Maximum Design Scenario (MDS) for the assessment relevant to Annex II diadromous fish and freshwater pearl mussel are set out in Table 8.

Table 8 MDS specific to the assessment for diadromous fish and associated features

Potential pathway	Phase	Maximum Design Scenario	Maximum Design Scenario – Scottish and English Waters		Justification
			Scotland	England	
EMF	Operation and Maintenance	• Presence of up to four 180 km long High Voltage Direct Current (HVDC) cables in a 320 kV symmetrical monopole arrangement or two 180 km long HVDC cables as a bipole arrangement at 525 kV; • Minimum target burial depth of 0.5 m; • Operation and maintenance phase of up 35 years.	• Presence of up to four 40 km long HVDC cables in a 320 kV symmetrical monopole arrangement or two 40 km long HVDC cables as a bipole arrangement at 525 kV; and • Minimum target burial depth of 0.5 m.	• Presence of up to four 140 km long HVDC cables in a 320 kV symmetrical monopole arrangement or two 140 km long HVDC cables as a bipole arrangement at 525 kV; and • Minimum target burial depth of 0.5 m.	Modelling completed for the Marine Scheme provides data on the level and attenuation of EMF for a symmetrical monopole configuration at 320 kV and a bipole configuration at 525 kV, assuming a horizontal separation distance of 25 m (further details are provided in ES, Volume 2, Chapter 5: Project Description (BBWF, 2023)). The worst-case EMF level and attenuation is calculated for each HVDC cable as a worst-case under the assumption that a bundled arrangement will not be used.

7.2.2. Measured Adopted as Part of the Marine Scheme

148. Measures relevant to diadromous fish and associated features are set out in Table 9.

Table 9 Measures relevant to diadromous fish and associated features

Mitigation measure	Justification	Applicable Jurisdiction
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
Cable Plan (CaP)	Suitable implementation and monitoring of cable protection through the Marine Scheme and adherence to a CaP. This will be produced and consulted on (in line with consent conditions) prior to installation and will include a detailed cable laying plan including geotechnical data, cable laying techniques and informed by a CBRA which will include details on minimum target burial depths. Burial of cables will not reduce the strength of EMF, the burial of cables does increase the distance between Offshore Export Cables and fish and shellfish. As detailed in ES, Volume 2, Chapter 5: Project Description, the Offshore Export Cables will be protected for 100% of the route (burial being the preferred method, with cable protection used where required and at crossings).	Scottish and English waters
Decommissioning Plan	The aim of this plan is to adhere to the existing UK and international legislation and guidance, with decommissioning industry practice applied. Overall, this will reduce the amount of long-term disturbance to the environment as far as reasonably practicable. While this measure has been committed to as part of the Marine Scheme, the maximum design scenario for the decommissioning phase has been considered in each of the assessments of effects.	Scottish and English waters
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 ES, Volume 2, Chapter 6: Route Appraisal and Consideration of Alternatives of the Marine Scheme ES.	Scottish and English waters
Rock protection	The use of rock protection will be minimised as far as practicable, and only used where required. Additional external cable protection (e.g. rock placement) will only be used where the minimum target burial depth cannot be achieved, for example in areas of hard ground or at third-party crossings. This will be informed by outputs from the Cable Burial Risk Assessment completed by the installation	Scottish and English waters

Mitigation measure	Justification	Applicable Jurisdiction
	contractor(s) prior to the commencement of installation. Rock utilised in berms will be clean with low fines. Use of graded rock and 1:3 profile berms at areas of rock protection will minimise potential fishing gear snagging risk.	
Cable grouping	Grouping cables of opposite polarity will result in deleterious interference between the EMFs from adjacent cables, which will further reduce the field EMF strengths resulting from the Marine Scheme. Furthermore, the design of the Marine Scheme will be further refined, informed by onward detailed engagement with the supply chain and various technical, practical and commercial considerations. As part of this refinement, the cable configuration will be optimised and options to reduce EMF assessed. Beyond the configuration commitment detailed above, practical solutions for reducing EMF arising from the Offshore Export Cables may include reducing cable separation or adopting a bundled solution.	Scottish and English waters

7.2.3. Species Accounts

149. Baseline information on the diadromous fish and associated features of the European sites identified for appropriate assessment has been gathered through a comprehensive desktop study of existing studies and data sets.

7.2.3.1. ATLANTIC SALMON

150. Atlantic salmon are an anadromous migratory species, which utilise both freshwater and the marine environment to fulfil their lifecycles. Spawning of salmon typically occurs from November to December but may extend from October to late February in certain areas, such as larger rivers. Spawning occurs in the upper reaches of rivers in gravelly substrate (Heessen, Daan and Ellis, 2015; NASCO, 2012). At approximately 10 cm, the salmon goes through a transformation to enable survival in saline condition (smoltification). The migration of smolts to the marine environment occurs following one to five years in the freshwater environment. This migration usually occurs from spring to early summer (Thorstad, *et al.*, 2012; Malcolm *et al.*, 2015). Malcolm *et al.* (2015) additionally suggested that there was evidence of smolt migration becoming earlier (by around 1.5 days per decade over a period of around 50 years).

151. Smolt migration is expected to be triggered by environmental cues, such as changes in current flow or temperature (Simmons *et al.*, 2021). Migration typically occurs in spring and is predominantly nocturnal (Thorstad *et al.*, 2012). This timing is consistent with observations from the River Tweed Commission (RTC) which found that most smolts will move to the open sea in April and May but may still be migrating through the Fish and Shellfish Ecology Study Area to their feeding grounds in June (RTC, 2023). Results from a study undertaken by the University of Glasgow on behalf of the Beatrice Offshore Windfarm, in the Moray Firth, also showed the majority of migrating smolts remain predominantly within the upper 1 m of the water column during migration (BOWL, 2017).

152. Once in the marine environment, post-smolts migrate offshore towards feeding grounds in the northeast Atlantic. Trawl surveys have found post-smolts along the continental shelf edge in, or en route to, deep sea feeding grounds (Malcolm *et al*., 2010; NatureScot, 2023c). Based on this understanding, it should be assumed that smolts or migrating salmon returning to rivers will pass through the Marine Scheme area.

153. Once Atlantic salmon have spent one to five years at sea, they return to their natal rivers to spawn. Gauld, Campbell and Lucas (2016) suggest that salmon migrate from the North Sea to the River Tweed almost all year round. However, throughout the year, this migration may experience peaks. The RTC report that the timing of the salmon run has changed in the past few years and now the peak of the salmon run is from May to July (RTC, 2023). Adult salmon generally swim at depths between 0 and 5 m below the sea surface, with brief dives into deeper water to approximately 64 m (Godfrey *et al.,* 2015).

154. Since 2010, estimated numbers of spawning salmon in Scotland have declined significantly. This is largely attributed to Atlantic Salmon being exposed to a number of pressures including, but not limited to, exploitation, disease and parasites, sea lice, and marine development activities. Marine development activities encompass renewable developments which may affect salmon through impacts on EMF which are integral to fish migration, amongst others. This decline has necessitated the publication of a Scottish Wild Salmon Strategy which aims to establish a new path of restoration and recovery for salmon in Scotland (Scottish Government, 2022).

155. In England, the status of salmon populations in rivers was assessed in 2021. Of the 42 principal salmon rivers in England, 37 were assessed as being ‘at risk’ or ‘probably at risk’ (Environment Agency, 2022). Several principal salmon rivers are located within proximity of the Marine Scheme

which are important to migratory species including: Tweed, Tay, Aln, Coquet, Tyne, Wear, Tees and Esk.

156. Atlantic salmon is an Annex II species under the Habitat Directive, on the OSPAR list of threatened and/or declining species and habitats, a Scottish PMF species, and is of cultural and conservation importance. Atlantic salmon are a qualifying feature of the Tay, Teith, South Esk, Dee and Tweed River SACs. Atlantic salmon are also host species of protected freshwater pearl mussels, a qualifying species of both the South Esk and River Dee SACs.

7.2.3.2. FRESHWATER PEARL MUSSELS

157. The freshwater pearl mussel is an endangered species of freshwater mussel. It is widely distributed in Europe but has suffered widespread decline and is highly vulnerable in every part of its former range. A Scottish national survey undertaken in 2015 found that freshwater pearl mussel had been lost from a number of rivers. More widely, since 1999 a total of 11 rivers in Scotland have seen their freshwater pearl mussel populations become extinct (JNCC, 2019).

158. Freshwater pearl mussel are similar in shape to common marine mussels but grow much larger and live far longer. They can grow as large as 20 cm and live for more than 100 years, making them one of the longest-lived invertebrates (Skinner *et al*., 2003). These mussels live on the beds of clean, fast flowing rivers, where they can be buried partly of wholly in coarse sand or fine gravel. Mussels have a complex life cycle, living on the gills of young Atlantic salmon or sea trout, for their first year, without causing harm to the fish (Skinner *et al*., 2003). While there is no potential for direct impacts on this species from the Marine Scheme (as this is an entirely freshwater species), freshwater pearl mussel have been included in the assessment, as a dependant qualifying species, as there is the potential for indirect impacts to occur due to effects on their host species (i.e. Atlantic salmon and sea trout) during their marine phase. Due to effects on Atlantic salmon populations being the only route to impact, where it is concluded that no adverse effects on integrity are to be found on Atlantic salmon, the same can be concluded for freshwater pearl mussel.

7.2.3.3. LAMPREY SPECIES

159. There are three species of lamprey – river, sea and brook lamprey (*Lampetra planeri*). Brook lamprey are purely freshwater and are therefore not relevant to this assessment. Lamprey species are listed as Annex II species of the Habitats Directive, a Scottish PMF species, and sea lamprey are listed on the OSPAR list of threatened and/or declining habitats and species. River and sea lamprey are diadromous, spawning in freshwater environments and migrating out to sea as juveniles. Most adults are parasitic on other fish or marine megafauna (NatureScot, 2022b).

160. River lamprey typically inhabit coastal waters, estuaries and accessible rivers for approximately one to two years following their migration to sea. Spawning typically occurs in autumn and spring, and migration out to sea occurs from late autumn onwards (Maitland and Herdson, 2003). They live on the hard bottoms or attached to larger fish, with spawning taking place in pre-excavated pits in riverbeds. Due to their preference for estuarine and territorial waters (Maitland and Herdson, 2003), it is unlikely they will be found within the vicinity of the Marine Scheme.

161. Sea lamprey occur in estuaries and easily accessible rivers (JNCC, 2021). Sea lamprey migrate further offshore than river lamprey for approximately 18 to 24 months before returning to rivers in spring / early summer to spawn (NatureScot, 2022b). The species need clean gravel for spawning, and marginal silt or sand for the burrowing of juveniles. Individuals spend most of their adult lives in the sea and prefer warmer waters in which to spawn (JNCC, 2021). Unlike salmon Atlantic salmon and sea trout (*Salmo trutta*), lamprey do not display a homing behaviour (Waldman *et al*., 2008).

162. The at-sea behaviour and migratory behaviour of lamprey remains relatively unknown (Malcom *et al*., 2010).

7.2.4. Impacts Requiring Assessment Electromagnetic Field Emissions (EMF) during O&M

163. EMF comprise electrical fields (E-fields), measured in volts per metre (V/m), and magnetic fields (B-fields), measured in microtesla (µT). B-fields penetrate most materials and so are emitted into the marine environment which, can result in an induced electric field (iE-field). Comparatively, direct E-fields are blocked by conductive sheathing, and are not emitted from the cables. The Earth has its own natural geomagnetic field (GMF), with associated B and iE-fields, which species rely on for navigation (Winklhofer, 2009; Gill and Desender, 2020).

164. In the North Sea, background measurements of the geomagnetic field (GMF) are approximately 50 µT, and the naturally occurring electric field in the North Sea is approximately 25 microvolts per metre (µV/m) (Tasker *et al*., 2010).

165. The strength of B-fields (and iE-fields) decreases rapidly in all directions with distance from the source due to field decay. Consequently, burying a cable results a reduced B-field at the seabed as a result of field decay with distance from the cable (Normandeau *et al.,* 2011; CSA, 2019; Hutchison *et al*., 2021). While cable burial and use of measures such as cable protection are not thought to be effective means of mitigating against B-fields (Hutchison *et al*., 2021), the separation does reduce the maximum field strength likely to be encountered by marine species on or near the seabed (Copping *et al*., 2020).

166. B-fields associated with DC cables are higher than those associated with equivalent AC cables because DC cables transmit electricity using a static current (as opposed to alternating) which enables formation of a static EMF. In the case of AC cables, this alternating current results in varying EMF, therefore the B-field is weaker.

167. Modelling has been completed for the Marine Scheme on the level and attenuation of the EMF emissions (B-fields only) for both a paired symmetrical monopole configuration rated at 320 kV (comprising 4 cables) and a bipole configuration rated at 525 kV.

168. As detailed in section 5.1.3, the maximum EMF strengths are associated with a bipole cable configuration rated at 525 kV. The 320 kV symmetrical monopole configuration resulted in lower EMF strengths, but a wider footprint of elevated EMF levels given the additional cables. The modelling estimates that:

- For the 525 kV bipole configuration including a pair of HVDC cables separated by 25 m and buried to a minimum depth of 0.5 m, the resulting EMF strength is approximately 658 µT. This is shown to decay with distance to the natural background GMF strengths within the immediate vicinity of the Marine Scheme (ES, Volume 2, Chapter 5: Project Description) at a distance of between 10-20 m from the Offshore Export Cables, both vertically and horizontally. In reality, it is likely that the Offshore Export Cables will be buried to a greater depth than this in some areas with favourable ground conditions, where EMF strengths will dissipate to the GMF even more rapidly.
- For the 320 kV symmetrical monopole configuration including four HVDC cables, separated by up to 25 m and buried to a minimum depth of 0.5 m, the resulting EMF strength is approximately 541 µT. This is shown to decay with distance to the natural GMF strength at a distance of between 10-20 m from the Offshore Export Cables, both vertically and horizontally. In reality, it is likely that the Offshore Export Cables will be buried to a greater depth than this in some areas with favourable ground conditions, where EMF strengths will dissipate to the GMF even more rapidly.

169. It is recognised that diadromous fish passing through the Marine Scheme have the potential to be affected by EMFs resulting from the operation of the Offshore Export Cables.

170. Contained within the skeletal structure of diadromous fish is magnetically sensitive material which enables them to use magnetic and/or electric fields as a navigational tool during migration (Gill and Bartlett, 2010). Consequently, the introduction of anthropogenic EMF into the marine environment has the potential to alter these migratory behaviours, potentially resulting in increased energy expenditure or interruptions to migration routes.

171. Atlantic salmon, sea lamprey and river lamprey may pass through the Marine Scheme area during migrations. While exact migration pathways are little understood, the European Sites detailed in Table 6 are designated for their importance to these species, and as such there is the potential for indirect effects on the sites through effects on their qualifying features outwith the site boundaries.

172. Although no field studies are available on the response of Atlantic salmon to EMF, Wyman *et al*. (2018) investigated the effect of EMF from a direct current undersea cable near San Francisco, California on Chinook salmon *Onchorhynchus tshawytscha*. It was concluded that the EMF emitted did not affect salmon migration and survival, although slight deviation from typical migratory routes was observed. In a laboratory setting, Armstrong *et al*. (2015) also did not find any physiological or behavioural response of Atlantic salmon to B-fields at intensities of 95 µT and below.

173. Most migratory salmonids swim within the top 5 m of the water (Godfrey *et al*., 2014). Therefore, they would likely not be affected by EMF emitted from buried cables, given the limited influence of EMF within a matter of metres of the seabed.

174. Lampreys (including sea and river species have specialised electroreceptors which are sensitive to low frequency electric fields (Bodznick and Preston, 1983). However, there is limited understanding of how the species make use of their electric sense. Weak electric fields may play a role in reproduction and electrical stimulation may illicit different responses in individuals that are in the feeding stage compared with in the reproductive stage (Chung-Davidson *et al*., 2008). It has been shown that the migration behaviour of sea lamprey (*Petromyzon marinus*) was affected (adults did not move) when stimulated with electrical fields of intensities of between 2.5 and 100 mV/m, normal behaviour was observed at electrical field intensities higher and lower than this range. It should be noted, however, that these levels are considerably higher than modelled induced electrical fields expected from subsea power cables (Normandeau *et al*. 2011). There is evidence that lamprey species have the ability to detect magnetic (B-fields), however little is known about the purpose of this sensitivity or thresholds of detection (Gill *et al.,* 2005). Sea lamprey are parasitic in nature whilst at sea, attaching to the body of larger highly mobile species at a distance above the seafloor. This behaviour means that the species is not expected to be exposed to EMF with any regularity.

175. EMF will be continuously emitted throughout the operational lifetime of the Marine Scheme (35 years). Current through the export cables and subsequently the strength of resulting EMF, will be dependent on the generation output from the BBWF. However, the modelling undertaken assumes the maximum capacity of the cables is utilised so the actual filed strengths will not exceed those outlined above.

176. Exposure to EMF as a result of the Marine Scheme will be reduced through cable burial and/or cable protection measures, delivered through management plans, including the CaP. The Applicant is also committed to adjacent cables in opposite polarity to help reduce EMF associated with the Marine Scheme. Grouping cables of opposite polarity will result in deleterious interference between the EMFs from adjacent cables, which will further reduce the field EMF strengths resulting from the Marine Scheme. Furthermore, the design of the Marine Scheme will be further refined, informed by

onward detailed engagement with the supply chain and various technical, practical and commercial considerations.

7.3. Assessment of Adverse Effect on Site Integrity (AEOSI): River Tay SAC

7.3.1. European Site Information

177. The River Tay SAC is located 61 km from the Marine Scheme at its closest point. The site comprises the longest river in Scotland, originating in western Scotland, flowing easterly across the Highlands before becoming tidal at the Firth of Tay. The site covers an area of 9461.63 ha. The site is designated for Annex I habitats and Annex II species, including sea lamprey, river lamprey and Atlantic salmon.

7.3.2. Conservation Objectives

178. Conservation objectives for the River Tay SAC have been developed by NatureScot as part of a Conservation Advice Package (NatureScot, 2020a). Conservation objectives for all qualifying species features are:

- to ensure that the qualifying features of River Tay SAC are in favourable condition; and
- to ensure that the integrity of the River Tay is maintained by meeting objectives 2a, 2b and 2c for each qualifying feature and make an appropriate contribution to achieving favourable conservation status.

179. Conservation objectives for sea lamprey and river lamprey are as follows:

- 2a. Maintain the population of the lamprey species' as viable components of the site;
- 2b. Maintain the distribution of the lamprey species throughout the site; and
- 2c. Maintain the habitats supporting the lamprey species within the site, and availability of food.

180. Conservation objectives for Atlantic salmon are as follows:

- 2a. Maintain the population of Atlantic salmon, including range of genetic types, as a viable component of the site;
- 2b. Maintain the distribution of Atlantic salmon throughout the site; and
- 2c. Maintain the habitats supporting Atlantic salmon within the site and availability of food.

181. The condition of sea and river lamprey was assessed in 2007 and Atlantic salmon condition was assessed in 2011. The outcomes of these feature condition assessments were as follows:

- Sea lamprey: favourable maintained;
- River lamprey: favourable maintained; and
- Atlantic salmon: favourable maintained.

7.3.3. Features and Effects Requiring Assessment

182. Table 10 summarises the Annex II diadromous fish species features of the River Tay SAC and effects which have been considered in the assessment of Adverse Effects on Integrity for this site.

183. For clarity, reference is only made to EMF emissions during Operations and Maintenance. This is because all other impacts during all stages of the Marine Scheme have already been screened out in terms of LSE and are therefore concluded to have no adverse effects on site integrity of any SACs (see Appendix 1, BBWFL, 2023a).

Table 10 Summary of Features and Effects Considered in the Assessment of Adverse Effects on Integrity for the River Tay SAC

Annex II Species Feature	EMF from Subsea Electrical Cabling
Sea lamprey (migrating)	✓ Operation and maintenance phase
River lamprey (migrating)	✓ Operation and maintenance phase
Atlantic salmon (migrating)	✓ Operation and maintenance phase

7.3.4. Project Alone Assessment

7.3.4.1. ELECTROMAGNETIC FIELD EMISSIONS (EMF) DURING O&M

7.3.4.1.1. Atlantic salmon

184. As discussed in section 7.2, the emission of localised EMFs from the operation of Offshore Export Cables could potentially interfere with the navigation of Atlantic salmon. However, impacts related to EMF are predicted to be of local spatial extent (i.e., within a few metres of buried cables). Given that Atlantic salmon is a pelagic species, it is unlikely to swim at depths sufficient to detect levels of EMF that would cause behavioural changes during migration. Whilst research shows that subsea power cables can result in altered patterns of salmonid behaviour, these changes are temporary and do not interfere with migration success or population health. Atlantic salmon is therefore deemed to have low sensitivity to, and high recoverability from, EMF.

185. The population of Atlantic salmon will be maintained as a viable component of the site and the extent and distribution of Atlantic salmon will not be reduced. The Marine Scheme does not overlap with the River Tay SAC so the extent and distribution and the structure and function of Atlantic salmon habitat will be unaffected.

186. Taking this into account, the assessment of Atlantic salmon carried out as part of this RIAA concludes that there **is no risk of an Adverse Effect on Site Integrity arising from the Marine Scheme for the River Tay SAC** as a result of EMF from Offshore Export Cables during the operation and maintenance phase.

7.3.4.1.2. Sea lamprey

187. As discussed in section 7.3.4, the emission of localised EMFs from the operation of Offshore Export Cables could potentially interfere with the navigation of sea lamprey. However, the limited available evidence suggests that disturbance to sea lamprey from EMF occurs at intensities considerably higher than those expected from subsea power cables. Due to sea lamprey's parasitic nature at sea, attaching to the body of larger, highly mobile species, well above the seafloor also means that they can be expected to rarely be exposed to EMF from subsea power cables buried in the seafloor. Therefore, any impacts would be localised and transient. Sea lamprey is therefore deemed to have low sensitivity to, and high recoverability from, EMF.

188. The population of sea lamprey will be maintained as a viable component of the site and the extent and distribution of sea lamprey will not be reduced. The Marine Scheme does not overlap with the River Tay SAC so the extent and distribution and the structure and function of sea lamprey habitat will be unaffected.

189. Taking this into account, the assessment of sea lamprey carried out as part of this RIAA concludes that there is **no risk of an Adverse Effect on Site Integrity arising from the Marine Scheme for the River Tay SAC** as a result of EMF from Offshore Export Cables during the operation and maintenance phase**.**

7.3.4.1.3. River lamprey

190. River lamprey will have a similar sensitivity to EMF as sea lamprey therefore the assessment presented in paragraphs 187 to 189 for sea lamprey will also apply to river lamprey. In addition, due to river lamprey's preference for estuarine waters, it is unlikely that river lamprey will interact with Offshore Export Cables associated with the Marine Scheme.

191. The population of river lamprey will be maintained as a viable component of the site and the extent and distribution of river lamprey and will not be reduced, and the structure and function of river lamprey habitat will be unaffected.

192. Taking this into account, the assessment of river lamprey carried out as part of this RIAA concludes that there is **no risk of an Adverse Effect on Site Integrity arising from the Marine Scheme for the River Tay SAC** as a result of EMF from Offshore Export Cables during the operation and maintenance phase**.**

7.3.5. Conclusions – Project Alone Assessment

193. The assessment has concluded that there is no direct spatial overlap between the Marine Scheme and the River Tay SAC, and so the extent and distribution and structure and function of the supporting habitats of the qualifying species will not be reduced. Similarly, the supporting processes on which the habitats of the qualifying species rely will be unaffected. Given any impacts from EMF will be localised and transient and the predicted low sensitivity of the qualifying species to this impact, the population and distribution of the qualifying species will be maintained.

194. Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the River Tay SAC as a result of EMF impacts with respect to operation and maintenance of the Marine Scheme acting alone.

7.3.6. Other Developments Requiring Consideration as part of the In-Combination Assessment

195. Figure 3 and Table 11 below provide a summary of the other developments with potential for in-combination effects on diadromous fish specifically relating to EMF. An explanation on the inclusion of these sites is detailed in section 7.3.7.

196. As the only impact pathway considered for the in combination assessment is marine in nature (EMF) consideration of the Onshore Scheme is not necessary in this assessment.

Table 11 Projects for consideration for in combination impacts relevant to River Tay SAC

Development	Status	Distance from Marine Scheme (km)	Description of Development/Plan	Dates of Construction (if Applicable)[12]	Dates of Operation (if Applicable)	Phase Overlap with the Marine Scheme
BBWF	In planning	0 km (direct physical overlap)	Offshore wind farm and associated transmission infrastructure	Construction anticipated to be 2025 to 2032	Operational from 2032	Construction and operation and maintenance
Scotland to England Green Link (SEGL) 1[13]	In planning	0 km (direct physical overlap)	HVDC electricity cable from the Torness area in East Lothian (Scotland) to Hawthorn Pit in County Durham	Construction anticipated to be 2024 to 2027	Operational from ~2027	Construction and operation and maintenance
Blyth Demonstrator Offshore Wind Farm 2	In planning	Unknown (potential for direct physical overlap)	A proposed development for a floating offshore wind farm located off the coast of Blyth which will be used exclusively to demonstrate innovative floating offshore wind technology	Unknown	Anticipated to be operational from 2025	Unknown (potentially construction and operation and maintenance)

7.3.7. In-Combination Assessment

197. As discussed in section 7.3.4, the impact extent as a result of EMF from subsea cables is considered to be highly localised. However, it is recognised that the Marine Scheme will cross or will be in close proximity to a number of operational or planned subsea cables. As EMF is anticipated to dissipate within 10 – 20 m (section 162), only those cables in the immediate vicinity are considered to have the potential to act in a cumulative manner in terms of EMF emissions.

198. Where the Marine Scheme crosses an operational cable or passes in close proximity, cable crossing and proximity agreements will be in place.

199. Cables within the BBWF boundary and associated with the Blyth Demonstration development will be buried as far as practicable. The BBWF development assumes a minimum target burial depth of 0.5 m (BBWFL, 2022) and the worst-case assumption for the Blyth Demonstration development

[12] Construction programme for the Marine Scheme is anticipated to be from Q4 2026 to Q4 2029

[13] As set out in ES, Volume 3, Appendix 3.4: Long-list of Cumulative Developments, the Applicant is aware of the partner project Eastern Green Link 2. This cable will not cross the Marine Scheme and the separation distances (approximately 3 km at the closest point) mean it does not need to be considered in further detail as part of the in-combination assessment.

is stated as 1.5 m (Narec, 2013). For the Scotland to England Green Link/Eastern Green Link 1 transmission infrastructure, the minimum burial depth is quoted as 0.6 m with a target burial depth of 1.5 m (National Grid and Scottish Power, 2022). Given these burial depths and the use of cable protection measures where trenching is not possible or where cable crossings are required, EMF levels are anticipated to remain as being highly localised.

200. There is considered to be **no risk of adverse effects on the FCS of Atlantic salmon or lamprey species as qualifying features of the River Tay SAC, as a result of EMF from the Marine Scheme in combination with other developments, plans and activities**.

7.4. Assessment of Adverse Effect on Site Integrity (AEOSI): River Teith SAC

7.4.1. European Site Information

201. The River Teith SAC is located 127 km from the Marine Scheme at its closest point. The River Teith is a large river that flows eastwards through central Scotland and the SAC covers an area of 1,289.33 ha. The river is the most significant tributary of the River Forth. The site is designated for Annex I habitats and Annex II species, including sea lamprey, river lamprey and Atlantic salmon.

7.4.2. Conservation Objectives

202. A Conservation Advice Package has not yet been published for the River Teith SAC. Conservation objectives for all qualifying species features 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 the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and
- to ensure for the qualifying species that the following are maintained in the long term:
    - Population of the species, including range of genetic types for salmon, 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.

203. There is no information available as to the current condition status of the designated features of the River Teith SAC.

7.4.3. Features and Effects Requiring Assessment

204. Table 12 summarises the Annex II diadromous fish species features of the River Teith SAC and effects which have been considered in the assessment of Adverse Effects on Integrity for this site.

205. For clarity, reference is only made to EMF emissions during Operations and Maintenance. This is because all other impacts during all stages of the Marine Scheme have already been screened out in terms of LSE and are therefore concluded to have no adverse effects on site integrity of any SACs (BBWFL, 2023a).

Table 12 Summary of Features and Effects Considered in the Assessment of Adverse Effects on Integrity for the River Teith SAC

Annex II Species Feature	EMF from Subsea Electrical Cabling
Sea lamprey (migrating)	✓ Operation and maintenance phase
River lamprey (migrating)	✓ Operation and maintenance phase
Atlantic salmon (migrating)	✓ Operation and maintenance phase

7.4.4. Project Alone Assessment

7.4.4.1. ELECTROMAGNETIC FIELD EMISSIONS (EMF) DURING O&M

7.4.4.1.1. Atlantic salmon

206. As discussed in section 7.2, the emission of localised EMFs from the operation of Offshore Export Cables could potentially interfere with the navigation of Atlantic salmon. However, impacts related to EMF are predicted to be of local spatial extent (i.e., within a few metres of buried cables). Given that Atlantic salmon is a pelagic species, it is unlikely to swim at depths sufficient to detect levels of EMF that would cause behavioural changes during migration. Whilst research shows that subsea power cables can result in altered patterns of salmonid behaviour, these changes are temporary and do not interfere with migration success or population health. Atlantic salmon is therefore deemed to have low sensitivity to, and high recoverability from, EMF.

207. The population of Atlantic salmon will be maintained as a viable component of the site and the extent and distribution of Atlantic salmon will not be reduced. The Marine Scheme does not overlap with the River Teith SAC so the extent and distribution and the structure and function of Atlantic salmon habitat will be unaffected.

208. Taking this into account, the assessment of Atlantic salmon carried out as part of this RIAA concludes that there is **no risk of an Adverse Effect on Site Integrity arising from the Marine Scheme for the River Teith SAC** as a result of EMF from Offshore Export Cables during the operation and maintenance phase.

7.4.4.1.2. Sea lamprey

209. As discussed in section 7.2, the emission of localised EMFs from the operation of Offshore Export Cables could potentially interfere with the navigation of sea lamprey. However, the limited available evidence suggests that disturbance to sea lamprey from EMF occurs at intensities considerably higher than those expected from subsea power cables. Due to sea lamprey's parasitic nature at sea, attaching to the body of larger, highly mobile species, well above the seafloor also means that they can be expected to rarely be exposed to the EMF from subsea power cables buried in the seafloor. Therefore, any impacts would be localised and transient. Sea lamprey is therefore deemed to have low sensitivity to, and high recoverability from, EMF.

210. The population of sea lamprey will be maintained as a viable component of the site and the extent and distribution of sea lamprey will not be reduced. The Marine Scheme does not overlap with the River Tweed SAC so the extent and distribution and the structure and function of sea lamprey habitat will be unaffected.

211. Taking this into account, the assessment of sea lamprey carried out as part of this RIAA concludes that there is **no risk of an Adverse Effect on Site Integrity arising from the Marine Scheme for the River Teith SAC** as a result of EMF from Offshore Export Cables during the operation and maintenance phase**.**

7.4.4.1.3. River lamprey

212. River lamprey will have a similar sensitivity to EMF as sea lamprey therefore the assessment presented in paragraphs 209 to 211 for sea lamprey will also apply to river lamprey. In addition, due to river lamprey's preference for estuarine waters, it is unlikely that river lamprey will interact with Offshore Export Cables associated with the Marine Scheme.

213. The population of river lamprey will be maintained as a viable component of the site and the extent and distribution of river lamprey and will not be reduced, and the structure and function of river lamprey habitat will be unaffected.

214. Taking this into account, the assessment of river lamprey carried out as part of this RIAA concludes that there is **no risk of an Adverse Effect on Site Integrity arising from the Marine Scheme for the River Teith SAC** as a result of EMF from Offshore Export Cables during the operation and maintenance phase**.**

7.4.5. Conclusions – Project Alone Assessment

215. The assessment has concluded that there is no direct spatial overlap between the Marine Scheme and the River Teith SAC, and so the extent and distribution and structure and function of the supporting habitats of the qualifying species will not be reduced. Similarly, the supporting processes on which the habitats of the qualifying species rely will be unaffected. Given any impacts from EMF will be localised and transient and the predicted low sensitivity of the qualifying species to this impact, the population and distribution of the qualifying species will be maintained.

216. Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the River Teith SAC as a result of EMF impacts with respect to operation and maintenance of the Marine Scheme acting alone.

7.4.6. Other Developments Requiring Consideration as part of the In-Combination Assessment

217. Figure 3 and Table 13 below provide a summary of the other developments with potential for in-combination effects on diadromous fish specifically relating to EMF. An explanation on the inclusion of these sites is detailed in section 7.4.7.

218. As the only impact pathway considered for the in combination assessment is marine in nature (EMF) consideration of the Onshore Scheme is not necessary in this assessment.

Table 13 Projects for consideration for in combination impacts relevant to River Teith SAC

Development	Status	Distance from Marine Scheme (km)	Description of Development/Plan	Dates of Construction (if Applicable)[14]	Dates of Operation (if Applicable)	Phase Overlap with the Marine Scheme
BBWF	In planning	0 km (direct physical overlap)	Offshore wind farm and associated transmission infrastructure	Construction anticipated to be 2025 to 2032	Operational from 2032	Construction and operation and maintenance
Scotland to England Green Link (SEGL) 1[15]	In planning	0 km (direct physical overlap)	HVDC electricity cable from the Torness area in East Lothian (Scotland) to Hawthorn Pit in County Durham	Construction anticipated to be 2024 to 2027	Operational from ~2027	Construction and operation and maintenance
Blyth Demonstrator Offshore Wind Farm 2	In planning	Unknown (potential for direct physical overlap)	A proposed development for a floating offshore wind farm located off the coast of Blyth which will be used exclusively to demonstrate innovative floating offshore wind technology	Unknown	Anticipated to be operational from 2025	Unknown (potentially construction and operation and maintenance)

7.4.7. In-Combination Assessment

219. As discussed in section 7.2, the impact extent as a result of EMF from subsea cables is considered to be highly localised. However, it is recognised that the Marine Scheme will cross or will be in close proximity to a number of operational or planned subsea cables. As EMF is anticipated to dissipate within 10 – 20 m (section 162), only those cables in the immediate vicinity are considered to have the potential to act in a cumulative manner in terms of EMF emissions.

220. Where the Marine Scheme crosses an operational cable or passes in close proximity, cable crossing and proximity agreements will be in place.

221. Cables within the BBWF boundary and associated with the Blyth Demonstration development will be buried as far as practicable. The BBWF development assumes a minimum target burial depth of 0.5 m (BBWFL, 2022) and the worst-case assumption for the Blyth Demonstration development

[14] Construction programme for the Marine Scheme is anticipated to be from Q4 2026 to Q4 2029.

[15] As set out in ES, Volume 3, Appendix 3.4: Long-list of Cumulative Developments, the Applicant is aware of the partner project Eastern Green Link 2. This cable will not cross the Marine Scheme and the separation distances (approximately 3 km at the closest point) mean it does not need to be considered in further detail as part of the in-combination assessment.

is stated as 1.5 m (Narec, 2013). For the Scotland to England Green Link/Eastern Green Link 1 transmission infrastructure, the minimum burial depth is quoted as 0.6 m with a target burial depth of 1.5 m (National Grid and Scottish Power, 2022). Given these burial depths and the use of cable protection measures where trenching is not possible or where cable crossings are required, EMF levels are anticipated to remain as being highly localised.

222. There is considered to **be no risk of adverse effects on the FCS of Atlantic salmon or lamprey species as qualifying features of the River Teith SAC, as a result of EMF from the Marine Scheme in combination with other developments, plans and activities.**

7.5. Assessment of Adverse Effect on Site Integrity (AEOSI): River South Esk SAC

7.5.1. European Site Information

223. The River Tweed SAC is located 50 km from the Marine Scheme at its closest point. The site is located in Angus in Eastern Scotland and spans 471.85 ha. The site is designated for two Annex II species, Atlantic salmon and freshwater pearl mussel.

7.5.2. Conservation Objectives

224. Conservation objectives for the River South Esk SAC have been developed by NatureScot as part of a Conservation Advice Package (NatureScot, 2020c). Conservation objectives for all qualifying features are:

- to ensure that the qualifying features of the River South Esk SAC are in favourable condition and make an appropriate contribution to achieving favourable conservation status; and
- to ensure that the integrity of the River South Esk SAC is restored by meeting objectives 2a, 2b, 2c for each qualifying feature (and 2d for freshwater pearl mussel).

225. Conservation objectives for freshwater pearl mussel are as follows:

- 2a. Restore the population of freshwater pearl mussel as a viable component of the site;
- 2b. Restore the distribution of freshwater pearl mussel throughout the site;
- 2c. Restore the habitats supporting freshwater pearl mussel within the site and availability of food; and
- 2d. Restore the distribution and viability of freshwater pearl mussel host species and their supporting habitats.

226. Conservation objectives for Atlantic salmon are as follows:

- 2a. Restore the population of Atlantic salmon, including range of genetic types, as a viable component of the site.
- 2b. Restore the distribution of Atlantic salmon throughout the site.
- 2c. Restore the habitats supporting Atlantic salmon within the site and availability of food.

227. The condition of freshwater pearl mussel at the site was assessed in 2009 and Atlantic salmon condition was assessed in 2011 (NatureScot, 2020x). The outcomes of these feature condition assessments were as follows:

- Freshwater pearl mussel: Unfavourable no change; and
- Atlantic salmon: Unfavourable recovering.

228. Freshwater pearl mussel has been assessed through NatureScot's site condition monitoring programme as being in unfavourable condition at River South Esk SAC due to the low number and density of freshwater pearl mussels present, low levels of juvenile recruitment, biological oxygen demand (fine sediments), and disturbance of mussel beds through largely historical illegal pearl fishing.

7.5.3. Features and Effects Requiring Assessment

229. Table 14 summarises the Annex II diadromous fish species feature, and dependent species (i.e. freshwater pearl mussel), of the River South Esk SAC and effects which have been considered in the assessment of Adverse Effects on Integrity for this site.

230. For clarity, reference is only made to EMF emissions during Operations and Maintenance. This is because all other impacts during all stages of the Marine Scheme have already been screened out in terms of LSE and are therefore concluded to have no adverse effects on site integrity of any SACs (BBWFL, 2023a).

Table 14 Summary of Features and Effects Considered in the Assessment of Adverse Effects on Integrity for the River Tweed SAC

Annex II Species Feature	EMF from Subsea Electrical Cabling
Atlantic salmon (migrating)	✓ Operation and maintenance phase
Freshwater pearl mussel (dependent species)	✓ Operation and maintenance phase

7.5.4. Project Alone Assessment

7.5.4.1. ELECTROMAGNETIC FIELD EMISSIONS (EMF) DURING O&M

7.5.4.1.1. Atlantic salmon

231. As discussed in section7.2, the emission of localised EMFs from the operation of Offshore Export Cables could potentially interfere with the navigation of Atlantic salmon. However, impacts related to EMF are predicted to be of local spatial extent (i.e., within a few metres of buried cables). Given that Atlantic salmon is a pelagic species, it is unlikely to swim at depths sufficient to detect levels of EMF that would cause behavioural changes during migration. Whilst research shows that subsea power cables can result in altered patterns of salmonid behaviour, these changes are temporary and do not interfere with migration success or population health. Atlantic salmon is therefore deemed to have low sensitivity to, and high recoverability from, EMF.

232. The population of Atlantic salmon will be maintained as a viable component of the site and the extent and distribution of Atlantic salmon will not be reduced. The Marine Scheme does not overlap with the River South Esk SAC so the extent and distribution and the structure and function of Atlantic salmon habitat will be unaffected.

233. Taking this into account, the assessment of Atlantic salmon carried out as part of this RIAA concludes that there is **no risk of an Adverse Effect on Site Integrity arising from the Marine Scheme for the River South Esk SAC** as a result of EMF from Offshore Export Cables during the operation and maintenance phase.

7.5.4.1.2. Freshwater pearl mussel

234. As adult freshwater pearl mussel are confined to freshwater habitats there is no pathway for direct effects to this species during the operation and maintenance phase as a result of EMF.

235. There is potential that adverse effects to host species such as Atlantic salmon could lead to indirect effects to freshwater pearl mussel. The assessment for Atlantic salmon above in paragraphs 231 - 233 concluded that EMF will not lead to adverse effects on the population, distribution and supporting habitats of Atlantic salmon, therefore there will be no significant indirect effects to freshwater pearl mussel. The population of freshwater pearl mussel will be maintained as a viable component of the site, the extent and distribution of freshwater pearl mussel and its natural habitat will not be reduced, and the structure and function of freshwater pearl mussel habitat will be unaffected. Taking this into account, the assessment of freshwater pearl mussel carried out as part of this RIAA concludes that there is **no risk of an Adverse Effect on Site Integrity arising from the Marine Scheme for the River South Esk SAC** as a result of EMF from Offshore Export Cables during the operation and maintenance phase.

7.5.5. Conclusions – Project Alone Assessment

236. The assessment has concluded that there is no direct spatial overlap between the Marine Scheme and the River South Esk SAC, and so the extent and distribution and structure and function of the supporting habitats of the qualifying species will not be reduced. Similarly, the supporting processes on which the habitats of the qualifying species rely will be unaffected. Given any impacts from EMF will be localised and transient and the predicted low sensitivity of the qualifying species to this impact, the population and distribution of the qualifying species will be maintained.

237. Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the River South Esk SAC as a result of EMF impacts with respect to operation and maintenance of the Marine Scheme acting alone.

7.5.6. Other Developments Requiring Consideration as part of the In-Combination Assessment

238. Figure 3 and Table 15 below provide a summary of the other developments with potential for in-combination effects on diadromous fish and freshwater pearl mussel specifically relating to EMF. An explanation on the inclusion of these sites is detailed in 7.5.7.

239. As the only impact pathway considered for the in combination assessment is marine in nature (EMF) consideration of the Onshore Scheme is not necessary in this assessment.

Table 15 Projects for consideration for in combination impacts relevant to River South Esk SAC

Development	Status	Distance from Marine Scheme (km)	Description of Development/Plan	Dates of Construction (if Applicable)[16]	Dates of Operation (if Applicable)	Phase Overlap with the Marine Scheme
BBWF	In planning	0 km (direct physical overlap)	Offshore wind farm and associated transmission infrastructure	Construction anticipated to be 2025 to 2032	Operational from 2032	Construction and operation and maintenance

[16] Construction programme for the Marine Scheme is anticipated to be from Q4 2026 to Q4 2029.

Development	Status	Distance from Marine Scheme (km)	Description of Development/Plan	Dates of Construction (if Applicable)[16]	Dates of Operation (if Applicable)	Phase Overlap with the Marine Scheme
Scotland to England Green Link (SEGL) 1[17]	In planning	0 km (direct physical overlap)	HVDC electricity cable from the Torness area in East Lothian (Scotland) to Hawthorn Pit in County Durham	Construction anticipated to be 2024 to 2027	Operational from ~2027	Construction and operation and maintenance
Blyth Demonstrator Offshore Wind Farm 2	In planning	Unknown (potential for direct physical overlap)	A proposed development for a floating offshore wind farm located off the coast of Blyth which will be used exclusively to demonstrate innovative floating offshore wind technology	Unknown	Anticipated to be operational from 2025	Unknown (potentially construction and operation and maintenance)

7.5.7. In-Combination Assessment

240. As discussed in section7.2, the impact extent as a result of EMF from subsea cables is considered to be highly localised. However, it is recognised that the Marine Scheme will cross or will be in close proximity to a number of operational or planned subsea cables. As EMF is anticipated to dissipate within 10 – 20 m (section 162), only those cables in the immediate vicinity are considered to have the potential to act in a cumulative manner in terms of EMF emissions.

241. Where the Marine Scheme crosses an operational cable or passes in close proximity, cable crossing and proximity agreements will be in place.

242. Cables within the BBWF boundary and associated with the Blyth Demonstration development will be buried as far as practicable. The BBWF development assumes a minimum target burial depth of 0.5 m (BBWFL, 2022) and the worst-case assumption for the Blyth Demonstration development is stated as 1.5 m (Narec, 2013). For the Scotland to England Green Link/Eastern Green Link 1 transmission infrastructure, the minimum burial depth is quoted as 0.6 m with a target burial depth of 1.5 m (National Grid and Scottish Power, 2022). Given these burial depths and the use of cable protection measures where trenching is not possible or where cable crossings are required, EMF levels are anticipated to remain as being highly localised.

[17] As set out in ES, Volume 3, Appendix 3.4: Long-list of Cumulative Developments, the Applicant is aware of the partner project Eastern Green Link 2. This cable will not cross the Marine Scheme and the separation distances (approximately 3 km at the closest point) mean it does not need to be considered in further detail as part of the in-combination assessment.

243. There is considered to be **no risk of adverse effects on the FCS of Atlantic salmon or freshwater pearl mussel as qualifying features of the River South Esk SAC, as a result of EMF from the Marine Scheme in combination with other developments, plans and activities.**

7.6. Assessment of Adverse Effect on Site Integrity (AEOSI): River Dee SAC

7.6.1. European Site Information

244. The River Dee SAC is located 71 km from the Marine Scheme at its closest point. The site is located in Aberdeenshire in Eastern Scotland and spans 2334.48 ha. The site is designated for Annex II species including Atlantic salmon and freshwater pearl mussel.

7.6.2. Conservation Objectives

245. Conservation objectives for the River Dee SAC have been developed by NatureScot as part of a Conservation Advice Package (NatureScot, 2020d). Conservation objectives for the qualifying features are:

- to ensure that the qualifying features of the River Dee SAC are in favourable condition and make an appropriate contribution to achieving favourable conservation status; and
- to ensure that the integrity of the River Dee SAC is restored by meeting objectives 2a, 2b, 2c for each qualifying feature (and 2d for freshwater pearl mussel).

246. Conservation objectives for freshwater pearl mussel are as follows:

- 2a. Restore the population of freshwater pearl mussel as a viable component of the site;
- 2b. Restore the distribution of freshwater pearl mussel throughout the site;
- 2c. Restore the habitats supporting freshwater pearl mussel within the site and availability of food; and
- 2d. Restore the distribution and viability of freshwater pearl mussel host species and their supporting habitats.

247. Conservation objectives for Atlantic salmon are as follows:

- 2a. Maintain the population of Atlantic salmon, including range of genetic types, as a viable component of the site.
- 2b. Miantain the distribution of Atlantic salmon throughout the site.
- 2c. Maintain the habitats supporting Atlantic salmon within the site and availability of food.

248. The condition of freshwater pearl mussel at the site was assessed in 2009 and Atlantic salmon condition was assessed in 2014 (NatureScot, 2020d). The outcomes of these feature condition assessments were as follows:

- Freshwater pearl mussel: Unfavourable declining; and
- Atlantic salmon: Favourable maintained.

249. Freshwater pearl mussel has been assessed through NatureScot's site condition monitoring programme as being in unfavourable condition at the River Dee SAC due to the low number and density of freshwater pearl mussels present, low levels of juvenile recruitment, water flow, river morphology, presence of filamentous algae and water quality.

7.6.3. Features and Effects Requiring Assessment

250. Table 16 summarises the Annex II diadromous fish species feature, and dependent species (i.e. freshwater pearl mussel), of the River Dee SAC and effects which have been considered in the assessment of Adverse Effects on Integrity for this site.

251. For clarity, reference is only made to EMF emissions during Operations and Maintenance. This is because all other impacts during all stages of the Marine Scheme have already been screened out in terms of LSE and are therefore concluded to have no adverse effects on site integrity of any SACs (BBWFL, 2023a).

Table 16 Summary of Features and Effects Considered in the Assessment of Adverse Effects on Integrity for the River Dee SAC

Annex II Species Feature	EMF from Subsea Electrical Cabling
Atlantic salmon (migrating)	✓ Operation and maintenance phase
Freshwater pearl mussel (dependent species)	✓ Operation and maintenance phase

7.6.4. Project Alone Assessment

7.6.4.1. ELECTROMAGNETIC FIELD EMISSIONS (EMF) DURING O&M

7.6.4.1.1. Atlantic salmon

252. As discussed in section7.2, the emission of localised EMFs from the operation of Offshore Export Cables could potentially interfere with the navigation of Atlantic salmon. However, impacts related to EMF are predicted to be of local spatial extent (i.e., within a few metres of buried cables). Given that Atlantic salmon is a pelagic species, it is unlikely to swim at depths sufficient to detect levels of EMF that would cause behavioural changes during migration. Whilst research shows that subsea power cables can result in altered patterns of salmonid behaviour, these changes are temporary and do not interfere with migration success or population health. Atlantic salmon is therefore deemed to have low sensitivity to, and high recoverability from, EMF.

253. The population of Atlantic salmon will be maintained as a viable component of the site and the extent and distribution of Atlantic salmon will not be reduced. The Marine Scheme does not overlap with the River Dee SAC so the extent and distribution and the structure and function of Atlantic salmon habitat will be unaffected.

254. Taking this into account, the assessment of Atlantic salmon carried out as part of this RIAA concludes that there is **no risk of an Adverse Effect on Site Integrity arising from the Marine Scheme for the River Dee SAC** as a result of EMF from Offshore Export Cables during the operation and maintenance phase.

7.6.4.1.2. Freshwater pearl mussel

255. As adult freshwater pearl mussel are confined to freshwater habitats there is no pathway for direct effects to this species during the operation and maintenance phase as a result of EMF.

256. There is potential that adverse effects to host species such as Atlantic salmon could lead to indirect effects to freshwater pearl mussel. The assessment for Atlantic salmon above in paragraphs 252 and 254 concluded that EMF will not lead to adverse effects on the population, distribution and supporting habitats of Atlantic salmon, therefore there will be no significant indirect effects to freshwater pearl mussel. The population of freshwater pearl mussel will be maintained as a viable component of the site, the extent and distribution of freshwater pearl mussel and its natural habitat will not be reduced, and the structure and function of freshwater pearl mussel habitat will be unaffected. Taking this into account, the assessment of freshwater pearl mussel carried out as part of this RIAA concludes that there is **no risk of an Adverse Effect on Site Integrity arising from the Marine Scheme for the River Dee SAC** as a result of EMF from Offshore Export Cables during the operation and maintenance phase.

7.6.5. Conclusions – Project Alone Assessment

257. The assessment has concluded that there is no direct spatial overlap between the Marine Scheme and the River Dee SAC, and so the extent and distribution and structure and function of the supporting habitats of the qualifying species will not be reduced. Similarly, the supporting processes on which the habitats of the qualifying species rely will be unaffected. Given any impacts from EMF will be localised and transient and the predicted low sensitivity of the qualifying species to this impact, the population and distribution of the qualifying species will be maintained.

258. Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the River Dee SAC as a result of EMF impacts with respect to operation and maintenance of the Marine Scheme acting alone.

7.6.6. Other Developments Requiring Consideration as part of the In-Combination Assessment

259. Table 17 below provides a summary of the other developments with potential for in-combination effects on diadromous fish and freshwater pearl mussel specifically relating to EMF. An explanation on the inclusion of these sites is detailed in 7.6.7.

260. As the only impact pathway considered for the in combination assessment is marine in nature (EMF) consideration of the Onshore Scheme is not necessary in this assessment.

Table 17 Projects for consideration for in combination impacts relevant to River South Dee SAC

Development	Status	Distance from Marine Scheme (km)	Description of Development/Plan	Dates of Construction (if Applicable)[18]	Dates of Operation (if Applicable)	Phase Overlap with the Marine Scheme
BBWF	In planning	0 km (direct physical overlap)	Offshore wind farm and associated transmission infrastructure	Construction anticipated to be 2025 to 2032	Operational from 2032	Construction and operation and maintenance

[18] Construction programme for the Marine Scheme is anticipated to be from Q4 2026 to Q4 2029.

Development	Status	Distance from Marine Scheme (km)	Description of Development/Plan	Dates of Construction (if Applicable)[18]	Dates of Operation (if Applicable)	Phase Overlap with the Marine Scheme
Scotland to England Green Link (SEGL) 1[19]	In planning	0 km (direct physical overlap)	HVDC electricity cable from the Torness area in East Lothian (Scotland) to Hawthorn Pit in County Durham	Construction anticipated to be 2024 to 2027	Operational from ~2027	Construction and operation and maintenance
Blyth Demonstrator Offshore Wind Farm 2	In planning	Unknown (potential for direct physical overlap)	A proposed development for a floating offshore wind farm located off the coast of Blyth which will be used exclusively to demonstrate innovative floating offshore wind technology	Unknown	Anticipated to be operational from 2025	Unknown (potentially construction and operation and maintenance)

7.6.7. In-Combination Assessment

261. As discussed in section7.2, the impact extent as a result of EMF from subsea cables is considered to be highly localised. However, it is recognised that the Marine Scheme will cross or will be in close proximity to a number of operational or planned subsea cables. As EMF is anticipated to dissipate within 10 – 20 m (section 7.2.4), only those cables in the immediate vicinity are considered to have the potential to act in a cumulative manner in terms of EMF emissions.

262. Where the Marine Scheme crosses an operational cable or passes in close proximity, cable crossing and proximity agreements will be in place.

263. Cables within the BBWF boundary and associated with the Blyth Demonstration development will be buried as far as practicable. The BBWF development assumes a minimum target burial depth of 0.5 m (BBWFL, 2022) and the worst-case assumption for the Blyth Demonstration development is stated as 1.5 m (Narec, 2013). For the Scotland to England Green Link/Eastern Green Link 1 transmission infrastructure, the minimum burial depth is quoted as 0.6 m with a target burial depth of 1.5 m (National Grid and Scottish Power, 2022). Given these burial depths and the use of cable protection measures where trenching is not possible or where cable crossings are required, EMF levels are anticipated to remain as being highly localised.

[19] As set out in ES, Volume 3, Appendix 3.4: Long-list of Cumulative Developments, the Applicant is aware of the partner project Eastern Green Link 2. This cable will not cross the Marine Scheme and the separation distances (approximately 3 km at the closest point) mean it does not need to be considered in further detail as part of the in-combination assessment.

264. There is considered to be **no risk of adverse effects on the FCS of Atlantic salmon or freshwater pearl mussel as qualifying features of the River Dee SAC, as a result of EMF from the Marine Scheme in combination with other developments, plans and activities.**

7.7. Assessment of Adverse Effect on Site Integrity (AEOSI): River Tweed SAC

7.7.1. European Site Information

265. The River Tweed SAC is located 40 km from the Marine Scheme at its closest point. The site, located in Eastern Scotland and Northumberland and Tyne and Wear encompasses 3742.62 ha of the River Tweed's catchment and 1,285 km of watercourse (NatureScot, 2020e). The site is designated for Annex I habitats and Annex II species, including diadromous fish species sea lamprey, river lamprey and Atlantic salmon.

7.7.2. Conservation Objectives

266. The River Tweed SAC crosses the border between England and Scotland. Management of the River Tweed SAC is shared by Natural England and NatureScot and conservation objectives for the site have been published by both SNCBs (NatureScot, 2020e; Natural England, 2018). In this assessment, both sets of conservation objectives have been consulted as the features being assessed are diadromous fish, and therefore may migrate to/from the English or Scottish parts of the SAC.

267. Conservation objectives and related supplementary advice developed by Natural England apply to those parts of the SAC lying in England (Natural England, 2019). The high-level objectives for the site are:

- To ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:
    - The extent and distribution of qualifying natural habitats and habitats of qualifying species;
    - The structure and function (including typical species) of qualifying natural habitats;
    - The structure and function of the habitats of qualifying species;
    - The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;
    - The populations of qualifying species; and
    - The distribution of qualifying species within the site.

268. Supplementary advice on conservation objectives, published on 19 March 2019 (Natural England, 2019), provides the site-specific attributes and targets specific to the sea lamprey, river lamprey and Atlantic salmon features of the site: These supplementary attributes and targets are considered in the assessments below.

269. A Conservation Advice Package for River Tweed SAC has been also developed by NatureScot (NatureScot 2020e). Conservation objectives for all qualifying species are:

- To ensure that the qualifying features of the River Tweed SAC are in favourable condition and make an appropriate contribution to achieving favourable conservation status.

- To ensure that the integrity of the River Tweed SAC is restored by meeting objectives 2a, 2b, 2c for each qualifying feature.

270. Conservation objectives for sea lamprey and river lamprey (applicable to Scottish Waters) are as follows:

- 2a. Maintain the population of the lamprey species' as viable components of the site;
- 2b. Maintain the distribution of the lamprey species throughout the site; and
- 2c. Maintain the habitats supporting the lamprey species within the site, and availability of food.

271. Conservation objectives for Atlantic salmon are as follows:

- 2a. Maintain the population of Atlantic salmon, including range of genetic types, as a viable component of the site;
- 2b. Maintain the distribution of Atlantic salmon throughout the site; and
- 2c. Maintain the habitats supporting Atlantic salmon within the site and availability of food.

272. The condition of diadromous fish features at the site was assessed in 2011 and 2018 (NatureScot, 2020e). The outcome of the feature condition assessment was as follows:

- Sea lamprey (assessed 2018): Unfavourable declining;
- River lamprey (assessed 2018): Favourable maintained; and
- Atlantic salmon (assessed 2011): Favourable maintained.

7.7.3. Features and Effects Requiring Assessment

273. Table 18 summarises the Annex II diadromous fish species features of the River Tweed SAC and effects which have been considered in the assessment of Adverse Effects on Integrity for this site.

274. For clarity, reference is only made to EMF emissions during Operations and Maintenance. This is because all other impacts during all stages of the Marine Scheme have already been screened out in terms of LSE and are therefore concluded to have no adverse effects on site integrity of any SACs (BBWFL, 2023a).

Table 18 Summary of Features and Effects Considered in the Assessment of Adverse Effects on Integrity for the River Tweed SAC

Annex II Species Feature	EMF from Subsea Electrical Cabling
Sea lamprey (migrating)	✓ Operation and maintenance phase
River lamprey (migrating)	✓ Operation and maintenance phase
Atlantic salmon (migrating)	✓ Operation and maintenance phase

7.7.4. Project Alone Assessment

7.7.4.1. ELECTROMAGNETIC FIELD EMISSIONS (EMF) DURING O&M

7.7.4.1.1. Atlantic salmon

275. As discussed in section7.2, the emission of localised EMFs from the operation of Offshore Export Cables could potentially interfere with the navigation of Atlantic salmon. However, impacts related to EMF are predicted to be of local spatial extent (i.e., within a few metres of buried cables). Given that Atlantic salmon is a pelagic species, it is unlikely to swim at depths sufficient to detect levels of EMF that would cause behavioural changes during migration. Whilst research shows that subsea power cables can result in altered patterns of salmonid behaviour, these changes are temporary and do not interfere with migration success or population health. Atlantic salmon is therefore deemed to have low sensitivity to, and high recoverability from, EMF.

276. The population of Atlantic salmon will be maintained as a viable component of the site and the extent and distribution of Atlantic salmon will not be reduced. The Marine Scheme does not overlap with the River Tweed SAC so the extent and distribution and the structure and function of Atlantic salmon habitat will be unaffected.

277. Taking this into account, the assessment of Atlantic salmon carried out as part of this RIAA concludes that there **is no risk of an Adverse Effect on Site Integrity arising from the Marine Scheme for the River Tweed SAC** as a result of EMF from Offshore Export Cables during the operation and maintenance phase.

7.7.4.1.2. Sea lamprey

278. As discussed in section7.2, the emission of localised EMFs from the operation of Offshore Export Cables could potentially interfere with the navigation of sea lamprey. However, the limited available evidence suggests that disturbance to sea lamprey from EMF occurs at intensities considerably higher than those expected from subsea power cables. Due to sea lamprey's parasitic nature at sea, attaching to the body of larger, highly mobile species, well above the seafloor also means that they can be expected to rarely be exposed to the EMF from subsea power cables buried in the seafloor. Therefore, any impacts would be localised and transient. Sea lamprey is therefore deemed to have low sensitivity to, and high recoverability from, EMF.

279. The population of sea lamprey will be maintained as a viable component of the site and the extent and distribution of sea lamprey will not be reduced. The Marine Scheme does not overlap with the River Tweed SAC so the extent and distribution and the structure and function of sea lamprey habitat will be unaffected.

280. Taking this into account, the assessment of sea lamprey carried out as part of this RIAA concludes that there is **no risk of an Adverse Effect on Site Integrity arising from the Marine Scheme for the River Tweed SAC** as a result of EMF from Offshore Export Cables during the operation and maintenance phase**.**

7.7.4.1.3. River lamprey

281. River lamprey will have a similar sensitivity to EMF as sea lamprey therefore the assessment presented in paragraphs 277 to 279 for sea lamprey will also apply to river lamprey. In addition, due to river lamprey's preference for estuarine waters, it is unlikely that river lamprey will interact with Offshore Export Cables associated with the Marine Scheme.

282. The population of river lamprey will be maintained as a viable component of the site and the extent and distribution of river lamprey and will not be reduced, and the structure and function of river lamprey habitat will be unaffected.

283. Taking this into account, the assessment of river lamprey carried out as part of this RIAA concludes that there is **no risk of an Adverse Effect on Site Integrity arising from the Marine Scheme for the River Tweed SAC** as a result of EMF from Offshore Export Cables during the operation and maintenance phase**.**

7.7.5. Conclusions – Project Alone Assessment

284. The assessment has concluded that there is no direct spatial overlap between the Marine Scheme and the River Tweed SAC, and so the extent and distribution and structure and function of the supporting habitats of the qualifying species will not be reduced. Similarly, the supporting processes on which the habitats of the qualifying species rely will be unaffected. Given any impacts from EMF will be localised and transient and the predicted low sensitivity of the qualifying species to this impact, the population and distribution of the qualifying species will be maintained.

285. Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the River Tweed SAC as a result of EMF impacts with respect to operation and maintenance of the Marine Scheme acting alone.

7.7.6. Other Developments Requiring Consideration as part of the In-Combination Assessment

286. Figure 3 and Table 19 below provide a summary of the other developments with potential for in-combination effects on diadromous fish specifically relating to EMF. An explanation on the inclusion of these sites is detailed in section 7.7.7

287. As the only impact pathway considered for the in combination assessment is marine in nature (EMF) consideration of the Onshore Scheme is not necessary in this assessment.

Table 19 Projects for consideration for in combination impacts relevant to River Tweed SAC

Development	Status	Distance from Marine Scheme (km)	Description of Development/Plan	Dates of Construction (if Applicable)[20]	Dates of Operation (if Applicable)	Phase Overlap with the Marine Scheme
BBWF	In planning	0 km (direct physical overlap)	Offshore wind farm and associated transmission infrastructure	Construction anticipated to be 2025 to 2032	Operational from 2032	Construction and operation and maintenance

[20] Construction programme for the Marine Scheme is anticipated to be from Q4 2026 to Q4 2029.

Development	Status	Distance from Marine Scheme (km)	Description of Development/Plan	Dates of Construction (if Applicable)[20]	Dates of Operation (if Applicable)	Phase Overlap with the Marine Scheme
Scotland to England Green Link (SEGL) 1[21]	In planning	0 km (direct physical overlap)	HVDC electricity cable from the Torness area in East Lothian (Scotland) to Hawthorn Pit in County Durham	Construction anticipated to be 2024 to 2027	Operational from ~2027	Construction and operation and maintenance
Blyth Demonstrator Offshore Wind Farm 2	In planning	Unknown (potential for direct physical overlap)	A proposed development for a floating offshore wind farm located off the coast of Blyth which will be used exclusively to demonstrate innovative floating offshore wind technology	Unknown	Anticipated to be operational from 2025	Unknown (potentially construction and operation and maintenance)

7.7.7. In-Combination Assessment

288. As discussed in section 7.3.4, the impact extent as a result of EMF from subsea cables is considered to be highly localised. However, it is recognised that the Marine Scheme will cross or will be in close proximity to a number of operational or planned subsea cables. As EMF is anticipated to dissipate within 10 – 20 m (section 162), only those cables in the immediate vicinity are considered to have the potential to act in a cumulative manner in terms of EMF emissions.

289. Where the Marine Scheme crosses an operational cable or passes in close proximity, cable crossing and proximity agreements will be in place.

290. Cables within the BBWF boundary and associated with the Blyth Demonstration development will be buried as far as practicable. The BBWF development assumes a minimum target burial depth of 0.5 m (BBWFL, 2022) and the worst-case assumption for the Blyth Demonstration development is stated as 1.5 m (Narec, 2013). For the Scotland to England Green Link/Eastern Green Link 1 transmission infrastructure, the minimum burial depth is quoted as 0.6 m with a target burial depth of 1.5 m (National Grid and Scottish Power, 2022). Given these burial depths and the use of cable protection measures where trenching is not possible or where cable crossings are required, EMF levels are anticipated to remain as being highly localised.

291. There is considered to be no risk of adverse effects on the FCS of Atlantic salmon or lamprey species as qualifying features of the River Tweed SAC, as a result of EMF from the Marine Scheme in combination with other developments, plans and activities.

[21] As set out in ES, Volume 3, Appendix 3.4: Long-list of Cumulative Developments, the Applicant is aware of the partner project Eastern Green Link 2. This cable will not cross the Marine Scheme and the separation distances (approximately 3 km at the closest point) mean it does not need to be considered in further detail as part of the in-combination assessment.

7.8. Assessment of Adverse Effect on Site Integrity: Tweed Estuary SAC

7.8.1. European Site Information

292. The Tweed Estuary SAC is located 40km from the Marine Scheme at its closest point. The site, located in Northumberland, encompasses the Tweed Estuary, a long and narrow estuary discharging into the North Sea. The site is designated for Annex I habitats and Annex II species, including diadromous fish species river lamprey and sea lamprey. The condition of the SAC's features had not been assessed at the time of writing.

7.8.2. Conservation Objectives

293. The conservation objectives for the Tweed Estuary SAC have been developed by Natural England and apply to the site and the individual species and/or assemblage of species for which the site has been classified. These high-level objectives are to ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the favourable conservation status of its qualifying features, by maintaining or restoring:

- The extent and distribution of qualifying natural habitats and habitats of the qualifying species;
- The structure and function (including typical species) of qualifying natural habitats;
- The structure and function of the habitats of the qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;
- The populations of each of the qualifying species; and
- The distribution of qualifying species within the site.

294. A condition assessment has not yet been undertaken for this site.

295. Supplementary advice on conservation objectives, last updated on the 13 March 2020, provides the site-specific attributes and targets specific to the sea lamprey and river lamprey features of the site. These supplementary attributes and targets are considered in the assessments below.

296. Supplementary advice is available for sea lamprey and river lamprey. All targets for these species have been set as 'Maintain' by Natural England, using expert judgement based on knowledge of the sensitivity of the feature to activities that are occurring/have occurred on the site.

7.8.3. Features and Effects Requiring Assessment

297. Table 20 summarises the Annex II diadromous fish species features of the Tweed Estuary SAC and effects which have been considered in the assessment of Adverse Effects on Integrity for this site.

298. For clarity, reference is only made to EMF emissions during Operation and Maintenance. This is because all other impacts during all stages of the Marine Scheme have already been screened out in terms of LSE and are therefore concluded to have no adverse effects on site integrity of any SACs (BBWFL, 2023a, included in Appendix 1).

Table 20 Summary of Features and Effects Considered in the Assessment of Adverse Effects on Integrity for the Tweed Estuary SAC

Annex II Species Feature	EMF from Subsea Electrical Cabling
Sea lamprey (migrating)	✓ Operation and maintenance phase
River lamprey (migrating)	✓ Operation and maintenance phase

7.8.4. Project Alone Assessment

7.8.4.1. ELECTROMAGNETIC FIELD EMISSIONS (EMF) DURING O&M

7.8.4.1.1. Sea lamprey

299. As discussed in section 7.3.4, the emission of localised EMFs from the operation of Offshore Export Cables could potentially interfere with the navigation of sea lamprey. However, the limited available evidence suggests that disturbance to sea lamprey from EMF occurs at intensities considerably higher than those expected from subsea power cables. Due to sea lamprey's parasitic nature at sea, attaching to the body of larger, highly mobile species, well above the seafloor also means that they can be expected to rarely be exposed to the EMF from subsea power cables buried in the seafloor. Therefore, any impacts would be localised and transient. Sea lamprey is therefore deemed to have low sensitivity to, and high recoverability from, EMF.

300. The population of sea lamprey will be maintained as a viable component of the site and the extent and distribution of sea lamprey will not be reduced. The Marine Scheme does not overlap with the Tweed Estuary SAC so the extent and distribution and the structure and function of sea lamprey habitat will be unaffected. Therefore, there will be no significant adverse effects on the qualifying Annex II diadromous fish feature, sea lamprey of the Tweed Estuary SAC as a result of EMF from subsea electrical cabling impacts during the operation and maintenance phase.

301. Taking this into account, the assessment of sea lamprey carried out as part of this RIAA concludes that there is no risk of an Adverse Effect on Site Integrity arising from the Marine Scheme for the River Tweed SAC as a result of EMF from Offshore Export Cables during the operation and maintenance phase.

7.8.4.1.2. River lamprey

302. River lamprey will have a similar sensitivity to EMF as sea lamprey therefore the assessment presented in paragraph 298 and 300 for sea lamprey will also apply to river lamprey. In addition, due to river lamprey's preference for estuarine waters, it is unlikely that river lamprey will interact with cables associated with the Marine Scheme.

303. The population of river lamprey will be maintained as a viable component of the site and the extent and distribution of river lamprey and will not be reduced, and the structure and function of river lamprey habitat will be unaffected.

304. Taking this into account, the assessment of sea lamprey carried out as part of this RIAA concludes that there is no risk of an Adverse Effect on Site Integrity arising from the Marine Scheme for the River Tweed SAC as a result of EMF from Offshore Export Cables during the operation and maintenance phase.

7.8.5. Conclusions – Project Alone Assessment

305. The assessment has concluded that there is no direct spatial overlap between the Marine Scheme and the Tweed Estuary SAC, and so the extent and distribution and structure and function of the supporting habitats of the qualifying species will not be reduced. Similarly, the supporting processes on which the habitats of the qualifying species rely will be unaffected. Given any impacts from EMF will be localised and transient and the predicted low sensitivity of the qualifying species to this impact, the population and distribution of the qualifying species will be maintained.

306. Therefore, it can be concluded that there is no risk of an adverse effect on the integrity of the Tweed Estuary SAC as a result of EMF impacts with respect to operation and maintenance of the Marine Scheme acting alone.

7.8.6. Other Developments Requiring Consideration as part of the In-Combination Assessment

307. Table 21 provides a summary of the other developments with potential for in-combination effects on the diadromous fish features of the Tweed Estuary SAC specifically relating to EMF. An explanation on the inclusion of these sites is detailed in section 7.8.7.

308. As the only impact pathway considered for the in combination assessment is marine in nature (EMF) consideration of the Onshore Scheme is not necessary in this assessment.

Table 21 Projects for consideration for in combination impacts relevant to River Tweed SAC

Development	Status	Distance from Marine Scheme (km)	Description of Development/ Plan	Dates of Construction (if Applicable)[22]	Dates of Operation (if Applicable)	Phase Overlap with the Marine Scheme
BBWF	In planning	0 km (direct physical overlap)	Offshore wind farm and associated transmission infrastructure	Construction anticipated to be 2025 to 2032	Operational from 2032	Construction and operation and maintenance
Scotland to England Green Link (SEGL) 1[23]	In planning	0 km (direct physical overlap)	HVDC electricity cable from the Torness area in East Lothian (Scotland) to Hawthorn Pit in County Durham	Construction anticipated to be 2024 to 2027	Operational from ~2027	Construction and operation and maintenance

[22] Construction programme for the Marine Scheme is anticipated to be from Q4 2026 to Q4 2029

[23] As set out in ES, Volume 3, Appendix 3.4: Long-list of Cumulative Developments, the Applicant is aware of the partner project Eastern Green Link 2. This cable will not cross the Marine Scheme and the separation distances (approximately 3 km at the closest point) mean it does not need to be considered in further detail as part of the in-combination assessment.

Development	Status	Distance from Marine Scheme (km)	Description of Development/ Plan	Dates of Construction (if Applicable)[22]	Dates of Operation (if Applicable)	Phase Overlap with the Marine Scheme
Blyth Demonstrator Offshore Wind Farm 2	In planning	Unknown (potential for direct physical overlap)	A proposed development for a floating offshore wind farm located off the coast of Blyth which will be used exclusively to demonstrate innovative floating offshore wind technology	Unknown	Anticipated to be operational from 2025	Unknown (potentially construction and operation and maintenance)

7.8.7. In-Combination Assessment

309. As discussed in 7.2, the impact extent as a result of EMF from subsea cables is considered to be highly localised. However, it is recognised that the Marine Scheme will cross or will be in close proximity to a number of operational or planned subsea cables. As EMF is anticipated to dissipate within 10 – 20 m (section 5.1.7), only those cables in the immediate vicinity are considered to have the potential to act in a cumulative manner in terms of EMF emissions.

310. Where the Marine Scheme crosses an operational cable or passes in close proximity, cable crossing and proximity agreements will be in place.

311. Cables within the BBWF boundary and associated with the Blyth Demonstration development will be buried as far as practicable. The BBWF development assumes a minimum target burial depth of 0.5 m (BBWFL, 2022) and the minimum burial depth assumption for the Blyth Demonstration development is stated as 1.0 m (Narec, 2013). For the Scotland to England Green Link/Eastern Green Link 1 transmission infrastructure, the minimum burial depth is quoted as 0.6 m with a target burial depth of 1.5 m (National Grid and Scottish Power, 2022). Given these burial depths and the use of cable protection measures where trenching is not possible or where cable crossings are required, EMF levels are anticipated to remain as being highly localised.

312. There is considered to be no risk of adverse effects on the FCS of river or sea lamprey species as qualifying features of the Tweed Estuary SAC, as a result of EMF from the Marine Scheme in combination with other development, plans and activities.

7.9. Assessment Summary and Conclusions

313. Six sites designated for diadromous fish species have been assessed for potential adverse effects as a result of the Marine Scheme. These sites are the River Tay SAC, River Teith SAC, River South Esk SAC, River Dee, River Tweed Estuary SAC and the Tweed Estuary SAC and were assessed for Scottish and English waters. The only pathway considered was EMF during the Operations and Maintenance phase of the Marine Scheme.

314. In conclusion no adverse effects on the FCS of any qualifying species were reported, and there no anticipated adverse effects on site integrity of r the River Tay SAC, River Teith SAC, River South Esk SAC, River Dee, Tweed Estuary SAC or the River Tweed SAC as a result of the Marine Scheme.

8. Appraisal of Adverse Effects on Site Integrity – SACs designated for Marine Mammals

8.1. Introduction

315. This section provides an assessment of the adverse effects from the Marine Scheme on SACs designated for the conservation of marine mammals which have been screened into the assessment. Screening in was based on the conclusions of the HRA Screening Stage 1 and subsequent screening advice received from NatureScot and Natural England. Qualifying species screened into this assessment are grey seal (*Halichoerus grypus)* and harbour porpoise (*Phocoena phocoena*).

316. Table 22 presents the SACs with marine mammals as qualifying features that have been screened into this RIAA. There are no SACs occurring solely in Scottish waters or Scotland which have been taken forward for assessment in the RIAA. Additionally following HRA Screening advice received from NatureScot (NatureScot, 2023b), the Southern North Sea SAC has not been screened into the assessment for Scotland.

Table 22 European sites designated for marine mammals being considered within the RIAA

SAC	Qualifying feature/s (only those features for consideration in the RIAA are listed)	Distance to Marine Scheme	
		Scottish Marine Scheme	English Marine Scheme
SACs in Scotland and England – to be assessed for both the Scottish and English Marine Scheme			
Berwickshire and North Northumberland Coast SAC	Grey seal	35 km	15 km
SACs in English waters – to be assessed for the English Marine Scheme only			
Southern North Sea SAC	Harbour porpoise	144 km	104 km

8.2. Assessment Information

317. The impact pathways for which potential LSE could not be ruled out are presented in Table 23.

Table 23 Impact pathways screened into the RIAA for marine mammals

Receptor	Marine Scheme stage Construction (C) Operation and maintenance (O&M) Decommissioning (D)	Potential pathway	Marine Scheme in Scottish Waters	Marine Scheme in English Waters
Grey seal	Construction	Underwater noise – specifically construction surveys (Sub bottom	✓	✓

Receptor	Marine Scheme stage Construction (C) Operation and maintenance (O&M) Decommissioning (D)	Potential pathway	Marine Scheme in Scottish Waters	Marine Scheme in English Waters
		profiler SBP and Ultra Short Baseline USBL)		
Harbour porpoise	Construction	Underwater noise – specifically construction surveys (SBP and USBL)	×	✓

8.2.1. Maximum Design Scenarios

318. The Maximum Design Scenario (MDS) for the assessment relevant to marine mammals are set out in Table 24.

Table 24 MDS specific to the assessment for marine mammals

Potential pathway	Phase	Maximum Design Scenario	Maximum Design Scenario – Scottish and English Waters		Justification
			Scotland	England	
Underwater noise	Construction and Decommissioning	Route preparation works such as seabed levelling, boulder clearance and pre-lay grapnel run (PLGR) will be undertaken by the support vessel. These works are expected to take up to 39 months. Construction of the Offshore Export Cable Corridor is expected to take up to 18 months. Pre-construction surveys may include geophysical, geotechnical and benthic surveys, for example. Construction of a maximum of four cables, up to 720 km total length.	Maximum design scenario applicable to both Scottish and English waters.		Maximum duration and nature of construction activities, including pre-construction.

8.2.2. Measured Adopted as Part of the Marine Scheme

319. Measures relevant to marine mammals are set out in Table 25.

Table 25 Measures relevant to marine mammals

Mitigation Measure	Justification	Applicable Jurisdiction
Marine Mammal Mitigation Plan (MMMP)	A MMMP will be developed for the marine mammal species of particular relevance to the Marine Scheme, if and when required. Given the potential for injury arising from the installation of the Offshore Export Cable, including the use of pre-installation survey techniques which have the potential to generate underwater noise, the JNCC guidelines for minimising the risk of injury to marine mammals will be employed.	Scotland and England (UK)
Geophysical survey mitigation	The potential for injury to marine mammals as a result of sub-bottom profiler (SBP) operations, will be mitigated by adoption of measures recommended in the JNCC 2017 guidelines (JNCC, 2017) for minimising the potential impacts to marine mammals from geophysical survey activities. These measures will be detailed within the MMMP and will include the use of Marine Mammal Observers and/or Passive Acoustic Monitoring (depending on daylight and meteorological conditions) to monitor a marine mammal mitigation zone around the survey vessel.	Scotland and England (UK)
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.	Scotland and England (UK)
Code of Conduct	To reduce potential for collision risk or injury to marine mammals, the Code of Conduct will be issued to all Marine Scheme vessels to be adhered to at all times. This will include requirements to: • Not deliberately approach marine mammals; • Maintain a minimum vessel speed; and • Avoid abrupt changes to vessel speed or direction should a marine mammal approach the vessel.	Scotland and England (UK)
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.	Scotland and England (UK)
Vessel best-practice / MARPOL	Compliance with MARPOL regulations and best-practice protocols to prevent and manage incidents of accidental release of marine contaminants.	Scotland and England (UK)
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 ES, Volume 2, Chapter 6: Route Appraisal and Consideration of Alternatives	Scotland and England (UK)

Mitigation Measure	Justification	Applicable Jurisdiction
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 minimise 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.	England
Landfall construction	Trenchless techniques, such as 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.	England

8.2.3. Species Accounts

320. Baseline information on the marine mammal features of the European sites identified for appropriate assessment has been gathered through a comprehensive desktop study of existing studies and data sets.

8.2.3.1. GREY SEAL

321. Approximately 36% of the world's grey seal population breeds in UK waters, with hotspots of species distribution located in the Inner and Outer Hebrides and Orkney (Duck, 2010). The waters of Scotland are home to approximately 86% of the UK grey seal population (SCOS, 2021) with the majority of these seals occurring around the Western and Northern Isles. The total UK grey seal population at the start of the 2020 breeding season (before pups were born) was estimated at 157,300 (95% CI=144,600-169,400) (this estimate is based on the most recent pup production estimates for 2019 on surveyed colonies in Orkney, the Inner and Outer Hebrides and the Firth of Forth).

322. Grey seals are a designated feature of 13 SACs around the UK. Two of these sites (the Isle of May SAC and the Berwickshire and North Northumberland Coast SAC) support important breeding colonies of grey seal in the vicinity of the Marine Scheme. This species uses haul-out sites for breeding, resting and moulting (SCOS, 2021) and the designated haul-out site for grey seal in closest proximity to the Marine Scheme is Fast Castle, a site within the Berwickshire and North Northumberland Coast SAC where pup production has shown a 16.9% increase per annum in recent years.

323. Grey seals can forage over distances of up to 135 km from a haul-out site over a period of 1 - 30 days (SCOS, 2021). This foraging activity typically occurs along the seabed (reaching maximum depths of 100 m) (SCOS, 2021). Tagging research from McConnell *et al*., (2001) for seals in the North Sea established that 43% of their time is spent within 10 km of a haul-out site. Given the foraging distances of grey seal of up to 135 km from a haul-out site, it is possible that individuals associated with the Isle of May SAC, the Berwickshire and North Northumberland Coast SAC and the Humber Estuary SAC could directly interact with the Marine Scheme. Research suggests that grey seals repeat the same trip from a haul-out site and return to this site 88% of the time (McConnell *et al*., 2001). As a result of the potential for interactions between the Marine Scheme and grey seals from these designated sites, regular usage of the Marine Scheme by some individuals could be important in the context of their preferred foraging grounds.

324. The UK grey seal population is considered stable, with population trends in the eastern colonies generally increasing (SCOS, 2021). Pup production in the Isle of May SAC stabilised in the 1990s,

with pup production in the Berwickshire and North Northumberland Coast SAC still increasing (SCOS, 2021). Grey seal is considered to be of 'favourable' conservation status within UK waters (JNCC, 2019), with the IUCN considering this species be of 'least concern' globally (IUCN, 2021).

8.2.3.2. HARBOUR PORPOISE

325. Harbour porpoise has a widespread distribution throughout the North Sea (Hague, Sinclair, & Sparling, 2020), with individuals most common in waters less than 100 m in depth (and rarely exceeding 200 m in depth). Harbour porpoises are present in UK waters throughout the year, with observed numbers peaking between July and September (Hague, Sinclair, & Sparling, 2020), and observations decreasing during the winter months. However, it is suggested that this decrease could be attributed to a decrease in detectability rather than a decrease in population numbers, while noting that there is a persistently high density of harbour porpoise during winter off the Lincolnshire and Norfolk coasts and the outer Thames estuary, within the southern part of the Southern North Sea SAC (Heinänen & Skov, 2015).

326. Harbour porpoise have been recorded in all SCANS-III blocks within Scottish and English Waters. The Marine Scheme lies wholly within Block R (which is located across both Scottish and English waters). The estimated harbour porpoise abundance in Block R is 38,646 individuals (95% confidence interval (CI) = 20,584 – 66,524), with a recorded density of 0.599 animals per km^2 (Hammond *et al*., 2021; Lacey *et al*., 2022).

327. Recent model predictions from Waggitt *et al*., (2019) identify seasonal shifts in harbour porpoise distribution, with a northward shift in harbour porpoise density between April and September to the waters off northeast Scotland and the northern North Sea. Densities appear to move southwards during October to March where significant numbers are recorded along the east coast of England and in the central North Sea (Heinänen & Skov, 2015).

328. Harbour porpoise population abundance estimates for the North Sea MU (as derived from the IAMMWG (2022) updated data of the SCANS-III survey (Hammond *et al*., 2021)) recorded 346,601 individuals (95% CI = 289,498 – 419,967). Of these, 159,632 individuals (95% CI = 127,442 – 199,954) were recorded within the UK portion of the North Sea MU (abundance estimates within the UK Exclusive Economic Zone (EEZ) (IAMMWG, 2022)). The Southern North Sea SAC is the largest SAC in UK and European waters and is an important area for harbour porpoise (covering an area of 36,951 km^2.

329. The Southern North Sea SAC includes key winter and summer habitat for the species (such as sandbanks and gravel beds). The northern boundary of the Southern North Sea SAC is located approximately 111 km to the east of the Marine Scheme.

330. The OSPAR commission (2008) consider harbour porpoise to be 'threatened and declining' throughout the Greater North Sea, however in the UK harbour porpoise is considered to be of 'favourable' conservation status, although the overall trend of the population is unknown (JNCC, 2023). The International Union for Conservation of Nature (IUCN) considers harbour porpoise to be of 'least concern' (despite having previously being considered 'vulnerable') (IUCN, 2021)).

    Post-construction survey works undertaken for the BOD project in 2018 concluded that harbour porpoise were the most frequently observed species during survey works, with a maximum of 5 animals observed during a one-day survey. This was a decrease from animals observed during a 2016 survey were a maximum of 13 animals were observed during a one-day survey (EDF Renewables, 2019).

331. To inform the marine mammal assessment undertaken for the BBWF, site-specific surveys were undertaken, in accordance with a methodology presented and agreed with stakeholders, as

reported in the EIA (BBWFL, 2022b). The digital aerial surveys were carried out over the BBWF array area and export cable corridor plus approximate 16 km buffer. Monthly surveys were carried out (typically one survey per month) between March 2019 to April 2021.

332. Six species of marine mammals were identified during the digital aerial surveys (Plate 4). Of the cetaceans, harbour porpoise was the most frequently recorded species and was sighted in every month of the year. Minke whale and white beaked dolphin were seasonally sighted with most observations between the months of May to September each year. Bottlenose dolphin were sighted in only two months over the 25 months of survey: October 2019 (one individual) and April 2021 (group of six individuals).

333. Seals were typically difficult to identify to species level from the aerial survey data. Grey seals were recorded in each month, with the exception of March 2021. Similarly, 'seal species' were recorded in each month, with the exception of February 2020. Only three sightings of harbour seal were made over the 25 months of survey with one individual recorded in each of January, February and April 2021. It is therefore considered likely that the majority of 'seal species' will be grey seal.

334. Plate 4 below includes an extract from the BBWF aerial digital survey analysis highlighting the monthly raw Sightings Data (number of animals) (uncorrected for effort) across the aerial survey Area.

Month	Harbour Porpoise	Minke Whale	White-beaked Dolphin	Bottlenose dolphin	Grey Seal	Harbour Seal	Cetacean Species	Seal/Small Cetacean Species	Seal Species	Total
8 Mar 2019	38				1			1	10	**50**
14 May 2019	181	6			16			6	65	**274**
21 Jun 2019	57	1	6		4			2	17	**87**
23 Jul 2019	54	13	3		9		1		13	**93**
6 Aug 2019	28	2			7				6	**43**
15 Sep 2019	20		4		6		3	3	7	**43**
17 Oct 2019	25			1	12		1	5	13	**57**
19 Nov 2019	14				1				9	**24**
7 Dec 2019	3				1			2	6	**13**
5 Feb 2020*	9				2		6		2	**20**
19 Feb 2020	12				4			1		**17**
21 Mar 2020	11						1		3	**15**
5 May 2020**	475	3			3			2	16	**499**
16 May 2020	24	1			3			2	3	**33**
9 Jun 2020	58		1		7		1	2	32	**101**
12 Jul 2020	77	13	7		7			1	20	**125**
9 Aug 2020	39	5			7				25	**76**
6 Sep 2020	80	3	24		11			4	68	**190**
16 Oct 2020	15				11		1	2	17	**46**
5 Nov 2020	17	1			4			1	10	**33**
1 Dec 2020	46				9			6	31	**92**
19 Jan 2021	38				8	1		1	33	**81**
16 Feb 2021	39				2	1		2	11	**55**
12 Apr 2021	149			6	12			4	9	**180**
24 Apr 2021	525	9			33	1		5	38	**611**
TOTALS	**2034**	**57**	**45**	**7**	**180**	**3**	**14**	**54**	**464**	**2858**

**For the purposes of analyses the February 2020 dataset will serve as the dataset for January 2020*

***For the purposes of analyses the 5 May 2020 dataset will serve as the dataset for April 2020*

Plate 4 Extract from BBWF EIA (Monthly Raw Sightings Data (Number of Animals) (Uncorrected for Effort) Across the Aerial Survey Impacts Requiring Assessment – Underwater noise.

8.2.4. Assessment of Injury and Disturbance Effects Associated with Underwater Noise

335. A number of underwater sound sources arising from the Marine Scheme have the potential to impact grey seals and harbour porpoise including vessel movement, cable lay installation and nearshore activities. The majority of the sound sources are unlikely to lead to any likely significant effect by virtue of their low intensity or due to them having such a low sound source intensity that they can effectively be masked by sound from other elements of the Marine Scheme.

336. However, in relation to pre-installation surveys (and particularly USBL and SBP) the potential for LSE cannot be ruled out for the grey seal and harbour porpoise and it will therefore be assessed for these species as qualifying features of the Berwickshire and North Northumberland Coast SAC and Southern North Sea SAC respectively, for the Marine Scheme for both Scottish and English waters.

337. For the assessment of acoustic impacts on grey seal and harbour porpoise, the principal metrics for describing the intensity of underwater sound are the sound pressure level (SPL) and sound exposure level (SEL). The SPL is a measure of the amplitude or intensity of a sound and, for impulsive sounds, is measured as a peak value. The SEL is a time-integrated measurement of

sound energy which considers the intensity as well as the duration of the sound. Cumulative SEL (SELcum) is a measure of sound exposure over a longer time period, typically 24 h, to assess the risk of longer periods of sound emission. Estimations of SELcum often taken into account the behaviour of animals (i.e. fleeing from a loud sound source) in estimating impact ranges. For impulsive sources considered in this assessment, underwater sound propagation modelling has been used to estimate impact ranges based on the peak SPL and SELcum¬ metrics.

338. MBES and SSS operate at higher frequencies outside the known hearing range of grey seal and harbour porpoise (typically < 300 kHz). **Therefore, no LSE is anticipated from these activities on grey seal or harbour porpoise and this underwater noise source has not been considered further in this assessment.**

8.2.4.1. INJURY IMPACTS ASSOCIATED WITH SBP EQUIPMENT

339. The use of SBP equipment has the potential to cause injury to marine mammals including grey seals and harbour porpoise without appropriate mitigation. Predicted ranges at which auditory injury (permanent threshold shift; PTS) impacts are likely to result from the use of SBP are presented in Table 26 . The Innomar SES 2000 has been modelled at two frequencies to exemplify the worst-case scenarios for an SBP.

340. The greatest injury range is predicted from the modelled low frequency (i.e. 4 kHz) operation of the Innomar SES 2000 SBP during shallow water operations (i.e. <10 m). In shallow waters, refraction off the seabed causes nearly immediate cylindrical spreading of sound emissions, causing the sound to travel farther along the horizontal plane of the water column more quickly. Deployment of a low frequency SBP in nearshore waters constitutes a worst-case image of the potential injury range attributable to this survey technique. These impact ranges are considered precautionary, due to the fact the beam of sound generated by SBP equipment is directed downward towards the seabed (Pace *et al*., 2021). The majority of power is contained within a roughly 45° angle from the source (the slant height of the conical sound source) to maximise penetration and the resultant imagery. Animals would need to be at the seabed below the sound source to experience the full sound levels behind the modelled impact ranges.

341. The majority of injury ranges were at least slightly reduced when considering animal movement during cumulative SEL estimation. Standard values for mean swimming speeds for grey seal and harbour porpoise have been identified: harbour porpoise (1.4 m/s; Westgate *et al*., 1995) and grey seal (1.8 m/s; Thompson, 2015). There is additional evidence that some of these swim speeds could be conservative, e.g. harbour porpoise may swim up to 4.3 m/s (Blix and Folkow, 1995; Otani *et al*., 2000).

342. To offer a representative estimation of the predicted sound exposure ranges of marine mammals moving away from the sound source, the model used a generalised swim speed of 1.5 m/s for both species, together with sound source characteristics for the representative SBP device.

343. Given that many species, harbour porpoise in particular, are likely to flee at speeds >1.5 m/s (Kastelein *et al*., 2018), this approach is considered to be appropriately precautionary. Considering that the surveys themselves will take place while the vessel is moving, the cumulative SELs of all equipment types are expected to be even lower based on the premise that animals are likely to move away from the mobile sound source at some angle opposite (i.e. greater than 180°) the direction of travel of the vessel.

344. It should also be noted that the modelling scenarios for the Innomar SES 2000 SBP aim to define the worst-case injury ranges associated with the deployment of survey equipment to be used in the Marine Scheme. The in-situ deployment of the acoustic survey equipment will most frequently occur in waters of intermediate depths (i.e. somewhere between 10-100 m). Moreover, the frequency

ranges depicted constitute the lowest and highest reasonably practicable settings for the survey activities modelled, meaning that the propagation of sound in the marine environment is also likely to fall somewhere between the modelled extremes. The injury ranges that are predicted to result from the use of SBP are thus likely to fall within the range of those defined by the model outputs (i.e. as predicted for water depths of 10 and 100 metres), thus the zone of potential injury will in most cases be smaller than those radii presented.

345. Mitigation measures specifically designed for geophysical surveys (JNCC, 2017) will be implemented to mitigate the risk of injury during SBP operations, as part of a Marine Mammal Mitigation Plan to be prepared post-consent. These measures include deployment of a Marine Mammal Observer (MMObs) to monitor for the presence of cetaceans within a 500 m mitigation zone prior to the commencement of, and during, any SBP surveys (JNCC, 2017).

Table 26 Sound modelling results for injury impacts from an exemplar SBP and USBL

Activity	Example equipment modelled	Depth (m)	Frequency (kHz)	SPLpeak dB re 1 µPA)	Injury range (m)					
					Cumulative SEL (static mammal)		Cumulative SEL (moving mammal)		Peak SPL	
					VHF	PW	VHF	PW	VHF	PW
SBP	Innomar SES 2000 sub-bottom profiler, 4 kHz	100	4	235	9	9	9	5	255	73
		10	4	235	N/E	N/E	N/E	N/E	445	188
	Innomar SES 2000 sub-bottom profiler, 100 kHz	100	100	235	28	17	19	17	30	18
		10	100	235	N/E	N/E	N/E	N/E	29	17
USBL	Kongsberg HiPAP	100	19.5 – 33.5	207	43	5	38	1	3	N/E
		10	19.5 – 33.5	207	4	3	4	N/E	3	N/E

346. In consideration of the relevant mitigation measures, none of the modelled scenarios indicate any injury events are likely to exceed the 500 m mitigation zone. As grey seal and harbour porpoise would need to come within 500 m of, and likely follow, the moving vessel or vehicular platforms from which the survey equipment will be deployed, the risk of injury to grey seal and harbour porpoise from survey activities can be mitigated through application of the JNCC protocol. For these reasons, the survey activities are not anticipated to result in any LSE to grey seal or harbour porpoise. The likelihood that any animals are within 500 m of the source, at the point at which the SBP is activated is very low.

8.2.4.2. DISTURBANCE IMPACTS ASSOCIATED WITH SBP

347. In addition to the potential injury, sound emissions have the potential to result in behavioural impacts to grey seals and harbour porpoise. Acoustic impacts associated with SBP operations are

likely to be highly localised due to the highly directional nature of the sound source. The effective deterrence ranges (EDRs) of SBP operations are considered to be precautionary due to the directional sound source and the influence of this directionality of the propagation of sound through the water. The EDR for SBP activities is 5 km, i.e., animals within 5 km of SBP operations have the potential to exhibit behavioural changes resulting in disturbance, and it is acknowledged that due to the source characteristics of SBP, this EDR is likely to be highly conservative (JNCC, 2020). These EDRs have been identified with respect to harbour porpoise but have been used here as representative of both harbour porpoise and grey seal. This is because there are no agreed quantitative thresholds for disturbance as there are for auditory injury. As harbour porpoise are notoriously 'shy', they are considered to be highly sensitive to disturbance, and there is evidence of harbour porpoise responding to impulsive construction sounds as well as vessel activity (Brandt et al., 2011, Graham et al., 2019). Therefore, using a disturbance range appropriate for this highly sensitive species is considered appropriate as a worst case for grey seal. EDR and numbers of individuals potentially disturbed are presented in Table 27.

Table 27 EDR and total MU population disturbance in relation to pre-construction SBP operations, based on a 5 km EDR for SBP

Species	Number of animals in UK portion of MU/SMU	Population density estimates per km^2	Number of individuals disturbed	Proportion of MU disturbed (%)	Population of relevant SAC	% of SAC population that may be disturbed by pre-construction surveys
Harbour porpoise	159,632	0.599*	47.05	0.03	Southern North Sea SAC: 28,889	0.17
Grey seals	33,567**	3***	235.62	0.70	Berwickshire and North Northumberland Coast SAC: 7,322	3.2

* SCANS III population estimate for Block R (per km^2; Hammond *et al*., 2021)
** Combined population estimate of East Scotland / Northeast England Seal Management Units (2016-2021; SCOS 2021)
*** Maximum number of animals estimated (per km^2; Carter *et al*., 2022)

348. The number of harbour porpoises disturbed by Marine Scheme pre-construction SBP operations has been calculated using a 5 km EDR radius around a survey vessel (giving a total area of disturbance of 78.54 km^2) and based on the SCANS III density estimate for block R, which overlaps the Marine Scheme. As a precautionary approach, it has been assumed that all harbour porpoise that could experience disturbance from SBP operations are associated with the Southern North Sea SAC. To estimate the percentage of the SAC population that may be disturbed by pre-construction surveys, the maximum population of the SAC (28,889 animals) has been taken from the Southern North Sea SAC Standard Data Form (JNCC, 2019). It is anticipated that for harbour porpoise, 0.17 % of the Southern North Sea SAC harbour porpoise population could experience behavioural disturbance.

349. The number of grey seals disturbed by Marine Scheme pre-construction SBP operations has been calculated using a 5 km EDR around a survey vessel (giving a total area of disturbance of 78.54 km^2) and based on the highest density from Carter et al., (2022) grey seal density maps

which intersects with a buffer of 5 km (EDR) around the Marine Scheme. As a precautionary approach, it has been assumed that all grey seals that could experience disturbance from SBP operations are associated with the Berwickshire and North Northumberland Coast SAC. To estimate the percentage of the SAC population that may be disturbed by pre-construction surveys, the most recent reported pup production for the SAC (7,322 pups) has been used as a minimum population size. It is anticipated that 3.2 % of the Berwickshire and North Northumberland Coast SAC grey seal population could experience behavioural disturbance.

8.2.4.3. INJURY IMPACTS ASSOCIATED WITH USBL

350. Sound emissions from USBL operations will attenuate below the instantaneous PTS (i.e., auditory injury) threshold for VHF cetaceans within three metres from the source, based on sound propagation modelling (Table 26)). It is highly unlikely that harbour porpoise will be present within 3 m of the USBL (given they are known to exhibit vessel avoidance; Graham *et al*., 2019), therefore the risk of auditory injury from USBL operations is very low and is not considered realistic. Although the SELcum metric does result in a larger predicted injury zone (up to 43 metres for a static VHF cetacean), because the acoustic source will be moving and SELcum is calculated over a 24 hour period, there is no plausible risk of auditory injury to harbour porpoise. For grey seal representing the PCW hearing group, injury ranges for USBL are in every case < 10 metres for both SPL or SELcum metrics, so although modelling predicts that some PTS thresholds could be exceeded, there is no realistic risk of injury to grey seal from this activity.

8.2.4.4. DISTURBANCE IMPACTS ASSOCIATED WITH USBL

351. Behavioural disturbance as a result of USBL is considered to be limited. Underwater sound propagation modelling has been carried out for an exemplar USBL to obtain range of disturbance to marine mammals, in line with the Level B harassment threshold of 160 dB re 1 µPa (Southall *et al*., 2007). The resulting radius of disturbance is 63 – 64 m, dependent on water depth, which ultimately means sound will attenuate below the threshold for disturbance relatively close to the source of sound.

Table 28 Potential for behavioural change (disturbance) from USBL operations

Activity	Frequency (kHz)	SPL_{rms} (dB re 1 µPA)	Depth	Range of disturbance (m)
USBL (Kongsberg HiPAP)	19.5 – 33.5	190	100	63
			10	64

Table 29 Predicted disturbance of grey seal and harbour porpoise in relation to USBL operations

Species	Equipment	SPL_{rms} for USBL operations (dB re 1 µPa at 1 m)	Max. range of behavioural change (disturbance) (metres)	Predicted area of disturbance (km^2)	Density estimates (per km^2)	Number of individuals disturbed	Number of individuals from relevant SAC using the Marine Scheme	% of SAC population that may be impacted by pre-construction surveys
Harbour porpoise	USBL (e.g., Kongsberg HiPAP)	190	64	0.013	0.434*	< 0.01	28,889	< 0.01
Grey seal					3**	0.04	7,322	< 0.01

* SCANS III block R predicted density
** Carter *et al.*, 2022 maximum predicted density

8.3. Assessment of AEOSI: Berwickshire and North Northumberland SAC

8.3.1. European Site Information

352. Berwickshire and North Northumberland Coast SAC is located 35 km from the Marine Scheme in Scottish waters and 15 km from the Marine Scheme in English waters. The SAC extends from St Abb's Head in south-east Scotland to Alnwick in north-east England. The site is designated for Annex I habitats and grey seal. The breeding colonies within this SAC support around 2.5% of annual UK pup production. There are two large discrete grey seal breeding populations (the Farne Islands and Fast Castle) with different population dynamics, however, pup production in the SAC as a whole is continuing to increase and does not show any indication of reaching an asymptote (SCOS, 2020). The grey seal feature of the site was last assessed as being in 'favourable maintained' condition in November 2014[24].

353. The grey seal feature of the site was last assessed as being in 'favourable maintained' condition in November 2014[25]. Although the JNCC Standard Data Form for the site (JNCC, 2015) reports a maximum population of 1,000 grey seals for the site, grey seal pup production within the Scottish portion of the SAC, together with the Farne Islands, was 7,322 pups in 2019 (SCOS, 2021), so it is likely that this population estimate is a substantial underestimate, and continues to increase. In the absence of a recent SAC population, for this assessment pup production has been used as a proxy for population size, which is conservative as it does not include any adults in the population.

354. The accessibility and suitability of pupping areas as well as haul-out areas (including rocky and coarse sediment shores) are critical for the survival and continued presence of the population of grey seals within the Berwickshire and North Northumberland Coast SAC (English Nature and SNH, 2000). The southern half of the SAC is an important haul out area for grey seals with two main haul-out sites: Farne Islands and Lindisfarne National Nature Reserve (NNR). On the Farne Islands in particular, rocky shores provide crucial habitats for grey seal breeding.

8.3.2. Conservation Objectives

355. The conservation objectives for Berwickshire and North Northumberland Coast SAC have been developed jointly by NatureScot and Natural England and apply to the site and the individual species and/or assemblage of species for which the site has been classified. These high-level objectives are to ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the Favourable Conservation Status of its qualifying features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitat and habitats of the qualifying species;
- the structure and function (including typical species) of qualifying natural habitats;
- the structure and function of the habitats of the qualifying species;
- the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;
- the populations of each of the qualifying species; and

[24] https://sitelink.nature.scot/site/8207

[25] https://sitelink.nature.scot/site/8207

- the distribution of qualifying species within the site.

356. As the most recent condition status of the grey seal feature of the site was 'favourable', it is assumed that the above list of conservation objectives must be maintained for grey seal.

357. Supplementary advice on conservation objectives, last updated by NatureScot and Natural England on 13 March 2020[26] provide the site-specific attributes and targets specific to the grey seal feature of the site. These supplementary attributes and targets are considered in the assessments below.

8.3.3. Features and Effects Requiring Assessment

358. The potential for adverse effects has been identified for the following Annex II marine mammal features of this site:

- Grey seal.

359. The following impacts associated with the construction and decommissioning of the Proposed Development were identified during HRA Screening as having the potential for adverse effects on grey seal at this site:

- ***Injury and disturbance*** from underwater noise from site investigation surveys.

8.3.4. Project Alone Assessment Underwater Noise – Geophysical Surveys

360. The following assessments takes into account grey seals as a qualifying feature of the Berwickshire and North Northumberland Coast SAC. This assessment is relevant for both Scotland and England.

8.3.4.1. SBP – RISK OF INJURY TO GREY SEALS

361. As discussed in section 8.2.4 given that grey seals would need to come within 500 m of, and likely follow, the moving vessel or vehicular platforms from which the SBP survey equipment will be deployed, the risk of injury to grey seal from survey activities can be mitigated through application of the JNCC protocol, additionally the likelihood that any grey seals would remain within 500 m of the source, at the point at which the SBP is activated is very low. For these reasons, the survey activities are not anticipated to result in any LSE to grey seal.

362. Taking this into account along with the distance from the Berwickshire and North Northumberland Coast SAC where grey seal is a qualifying feature (15 km), therefore **no adverse effects on the FCS of grey seals as a qualifying feature of the Berwickshire and North Northumberland Coast SAC** (relevant for Scotland and England) are anticipated as a result of injury from SBP during pre-construction survey activities for the Marine Scheme.

8.3.4.1.1. RISK OF DISTURBANCE TO GREY SEALS

363. As discussed in section 8.2.4 the number of grey seal disturbed by Marine Scheme pre-construction SBP operations has been calculated using a 5 km EDR radius around a survey vessel (giving a total area of disturbance of 78.54 km^2) and based on relevant species-specific densities. For grey

[26] https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK0017072&SiteName=berwi&SiteNameDisplay=Berwickshire+and+North+Northumberland+Coast+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=1

seal the densities were derived from the Carter *et al* (2022) at sea distribution maps and using the maximum value across all grid cells that overlapped the Marine Scheme. It is anticipated that for grey seal less than 1% of the respective Management Unit will exhibit behavioural disturbance.

364. Approximately 236 grey seals could experience disturbance from SBP operations. Assuming an SAC population of 7,322 grey seals, and that all grey seals that could be disturbed are SAC animals, this equates to 3.2 % of the grey seal population of the Berwickshire and North Northumberland Coast SAC, Any disturbance impacts will be short lived, SBP operations are undertaken from a moving vessel, and the behaviour of any grey seals which exhibit disturbance behaviour will return to normal following cessation of SBP activities, with no long-term consequences. Therefore, **no adverse effects on the FCS of grey seal as a qualifying feature of the Berwickshire and Northumberland Coast** SAC (relevant to Scotland and England) are anticipated as a result of disturbance from SBP during pre-construction survey activities for the Marine Scheme.

8.3.4.2. USBL – RISK OF INJURY TO GREY SEAL

365. As discussed in section 8.2.4 for grey seal representing the PCW hearing group, injury ranges for USBL are in every case < 10 metres for both SPL or SELcum metrics, so although modelling predicts that some PTS thresholds could be exceeded, there is no realistic risk of injury to grey seal from this activity. Therefore, no LSE is predicted to grey seal as a result of USBL during construction activities for the Marine Scheme and therefore **no adverse impacts on the site integrity or FCS of the Berwickshire and Northumberland SAC** (relevant to Scotland and England) are anticipated as a result of injury from USBL during pre-construction survey activities for the Marine Scheme.

8.3.4.3. USBL – RISK OF DISTURBANCE TO GREY SEAL

366. As discussed in section8.2.4 behavioural disturbance as a result of USBL is considered to be limited. Underwater sound propagation modelling has been carried out for an exemplar USBL to obtain range of disturbance to marine mammals, in line with the Level B harassment threshold of 160 dB re 1 µPa (Southall *et al.*, 2007). The resulting radius of disturbance is 63 – 64 m, dependent on water depth. Which ultimately means sound will attenuate below the threshold for disturbance relatively close to the source of sound.

367. Assuming an SAC population of 7,322 grey seals, and that all grey seals that could be disturbed are SAC animals, it is inferred that < 0.01 % of the Berwickshire and North Northumberland Coast SAC grey seal population has the potential to be disturbed as a result of USBL operations.

368. Impacts from underwater noise generated from USBL, will represent only a very minor shift from baseline conditions, for the short duration of survey activities. Any disturbance impacts will be short lived, USBL operations are undertaken from a moving vessel, and the behaviour of any grey seal which exhibit disturbance behaviour will return to normal following cessation of USBL activities. Therefore, **no adverse effects on the FCS of grey seal as a qualifying feature of the Berwickshire and North Northumberland SAC** (relevant to Scotland and England) are anticipated as a result of disturbance from USBL during pre-construction survey activities for the Marine Scheme.

8.3.5. In-Combination Assessment

369. Figure 3 and Table 30 below provides a summary of the other developments with potential for in-combination effects on marine mammals specifically in relation to underwater noise from SBP and

USBL as a result of pre-construction surveys. An explanation of the projects and plans included follows within the assessment.

Table 30 Projects for consideration for in combination impacts relevant to protected sites with marine mammals as qualifying features

Development/ Plan	Status	Distance from Marine Scheme (km)	Description of Development/Plan	Dates of Construction (if Applicable)[27]	Dates of Operation (if Applicable)	Phase Overlap with the Marine Scheme
BBWF	In planning	0 km (direct physical overlap)	Offshore wind farm and associated grid connection infrastructure	Construction anticipated to be 2025 to 2032	Operational from 2032	Construction and operation and maintenance

8.3.5.1. DISTURBANCE FROM SBP AND USBL TO GREY SEAL

370. As discussed in section 8.3, there is no anticipated adverse effects to the FCS for the grey seal feature of the Berwickshire and North Northumberland SAC as a result of underwater noise from SBP or USBL associated with the pre-construction activities of the Marine Scheme. This section assesses the potential for in combination effects on the grey seal feature of the Berwickshire and North Northumberland SAC resulting from SBP and USBL along with other projects and developments.

371. Of the 24 developments identified for consideration in-combination impacts for all potential impacts from the Marine Scheme, nine have construction timelines which have the potential to overlap with the construction phase of the Marine Scheme. Given the localised nature of works associated with the Marine Scheme, the intervening distance to the developments and their construction timelines, the Inch Cape Offshore Wind Farm, the Seagreen 1A Project and the Inch Cape OFTO have not been considered further as part of this assessment. Of the remaining six developments one is an offshore wind farm (the BBWF), four are subsea cables (EGL1; EGL3; EGL4; and EGL 2) and one is the Cambois Connection Onshore Scheme. The Cambois Connection Onshore Scheme has not been considered further as any works associated with the construction of the Landfall are not considered to generate an underwater sound profile which will result in injury or disturbance to marine mammals, particularly owing to the Applicant's commitments to adopt trenchless technology, such as HDD. Underwater sound impacts to marine mammals associated with the construction of subsea cables is considered not significant (section 11.12.1) and therefore has not been considered further as part of this assessment. As such, the only development which is considered to have the potential to act in combination in terms of underwater noise from SBP and USBL on the grey seal feature of the Berwickshire and North Northumberland SAC is the construction of the BBWF.

372. As discussed in section 8.2.4 sound emissions from SBP have the potential to result in behavioural impacts to grey seal. Using a 5 km EDR radius and based on relevant species densities, it was concluded that SBP surveys are not likely to have any long-term, lasting effect on grey seals.

[27] Construction programme for the Marine Scheme is anticipated to be from Q4 2026 to Q4 2029.

373. As assessed within section 8.2.4 behavioural disturbance as a result of USBL the maximum range of disturbance is estimated to be 64 m, which, considering the grey seal densities in the region, equates to >0.05 individuals being affected.

374. Through the use of this disturbance criteria BBWF was able to qualify the magnitude of effect and spatial extent of disturbance. Concluding that while there is the potential for disturbance to marine mammals as a result of piling activities, the iPCoD modelling conducted by BBWF demonstrated that this is not expected to result in population consequences for any marine mammal species (BBWF, 2022).

375. Therefore, while there is the potential for cumulative underwater sound effects on marine mammals, given the BBWF piling is not anticipated to result in any population level consequences and the very low numbers of marine mammals predicted to be affected by the Marine Scheme, the risk of in-combination LSE is considered low.

376. There is considered to be no risk of LSE on the FCS of grey seal as a qualifying feature of the Berwickshire and North Northumberland Coast SAC (relevant to Scotland and England), as a result of SBP and USBL from construction activities associated with the Marine Scheme in combination with other development, plans and activities.

8.4. Assessment of AEOSI: Southern North Sea SAC

8.4.1. European Site Information

377. The Southern North Sea SAC, covering an area of 36,951 km^2, was designated to conserve harbour porpoise (JNCC, 2021b). The majority of the site lies offshore (88%), extending into English territorial waters (12%) and it is located 144 km to the south-east from the Marine Scheme in Scottish Waters and 104 km to the south-east from the Marine Scheme in English Waters. As outlined previously (section 8.2) this assessment is relevant to the Marine Scheme in English Waters only.

378. Population estimates within the site based on the 2016 survey are a minimum of 20,237 and a maximum of 41,538 individuals (JNCC, 2019a). The SAC area supports an estimated 17.5% of the UK North Sea MU population. The northern part supports higher densities of porpoises during the summer season (April to September), whilst the southern part is recognised as an important area during the winter season (October to March) (JNCC, 2021b).

379. Harbour porpoise condition has not yet been assessed at this site, however, the site assessment assigns a grade of A conservation to the site, which is deemed excellent.

8.4.2. Conservation Objectives

380. The conservation objectives for the Southern North Sea SAC have been developed jointly by JNCC and Natural England (JNCC, 2019b) and are as follows:

- To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status (FCS) for harbour porpoise in UK waters. In the context of natural change, this will be achieved by ensuring that:
    - harbour porpoise is a viable component of the site;
    - there is no significant disturbance of the species; and

- the condition of supporting habitats and processes, and the availability of prey is maintained.

381. In the Advice on Operations for harbour porpoise and Southern North Sea SAC (JNCC, 2019b), noise disturbance from a plan individually or in-combination is regarded as significant if it excludes harbour porpoises from more than 20% of the part of the SAC that was designated on the basis of higher persistent densities for specific season (thereafter referred to as relevant area) in any given day, and an average of 10% of the relevant area of the site over specific season.

382. It is noted that the advice on operations (JNCC, 2019b) state that, with regard to assessing impacts to Conservation Objective 1 (harbour porpoise is a viable component of the site), 'the reference population for assessments against this objective is the Management Unit (MU) population in which the SAC is situated (IAMMWG, 2015). The IAMMWG (2021) estimated abundance for the North Sea Management Unit (NS MU) is 346,601 individuals.

8.4.3. Features and effects for assessment

383. The potential for adverse effects has been identified for the following Annex II marine mammal features of this site:

- Harbour porpoise

384. The following impacts associated with the construction and decommissioning of the Proposed Development were identified during HRA Screening as having the potential for adverse effects on harbour porpoise at this site:

- ***Injury and disturbance*** from underwater noise from site investigation surveys.

8.4.4. Project Alone Assessment Underwater Noise – Geophysical Surveys

385. The following assessments takes into account harbour porpoise as a qualifying feature of the Southern North Sea SAC, this assessment is only relevant for England.

8.4.4.1. SBP – RISK OF INJURY TO HARBOUR PORPOISE

386. As discussed in section 8.2.4 given that harbour porpoise would need to come within 500 m of, and likely follow, the moving vessel or vehicular platforms from which the SBP survey equipment will be deployed, the risk of injury to harbour porpoise from survey activities can be mitigated through application of the JNCC protocol. For these reasons, the survey activities are not anticipated to result in any LSE to harbour porpoise.

387. Taking this into account along with the distance from the Southern North Sea SAC, where harbour porpoise is a qualifying feature (104 km), therefore **no adverse effects for harbour porpoise as a qualifying feature of the southern North Sea SAC** (relevant only for England) are anticipated as a result of injury from SBP during pre-construction survey activities for the Marine Scheme.

8.4.4.1.1. RISK OF DISTURBANCE TO HARBOUR PORPOISE Associated with SBP

388. As discussed in section 8.2.4 the number of harbour porpoise disturbed by Marine Scheme pre-construction SBP operations has been calculated using a 5 km EDR radius around a survey vessel (giving a total area of disturbance of 78.54 km^2) and based on relevant species-specific densities. For harbour porpoise the density (0.599 individuals per km^2) was derived from SCANS III estimates for SCANS block R, which overlaps the Marine Scheme.

389. Impacts from underwater noise generated from SBP, will represent only a minor shift from baseline conditions, for the short duration of survey activities. Any disturbance impacts will be short lived and the behaviour of any harbour porpoise which exhibit disturbance behaviour will return to normal following cessation of SBP activities. Therefore, **no adverse effects on the FCS of harbour porpoise as a qualifying feature of the Southern North Sea SAC** (relevant for English waters) are anticipated as a result of disturbance from SBP during pre-construction survey activities for the Marine Scheme.

8.4.4.2. USBL – RISK OF INJURY TO HARBOUR PORPOISE

390. As discussed in section 8.2.4 sound emissions from USBL operations will attenuate below the instantaneous PTS (i.e., auditory injury) threshold for VHF cetaceans within 3 meters from the source, based on sound propagation modelling. It is highly unlikely that harbour porpoise will be present within 3 m of the USBL (given they are known to exhibit vessel avoidance; Graham *et al*., 2019), therefore the risk of auditory injury from USBL operations is very low and is not considered realistic. Although the SELcum metric does result in a larger predicted injury zone (up to 43 metres for a static VHF cetacean), because the acoustic source will be moving and SELcum is calculated over a 24 hour period, there is no plausible risk of auditory injury to harbour porpoise. Therefore, no LSE is predicted to harbour porpoise as a result of USBL during construction activities for the Marine Scheme and therefore, **no adverse effects on the FCS of harbour porpoise as a qualifying feature of the Southern North Sea SAC** (relevant for English waters) are anticipated as a result of injury from USBL during pre-construction survey activities for the Marine Scheme.

8.4.4.3. USBL – RISK OF DISTURBANCE TO HARBOUR PORPOISE

391. As discussed in section 8.2.4 behavioural disturbance as a result of USBL is considered to be limited. Underwater sound propagation modelling has been carried out for an exemplar USBL to obtain range of disturbance to marine mammals, in line with the Level B harassment threshold of 160 dB re 1 µPa (Southall *et al.*, 2007). The resulting radius of disturbance is 63 – 64 m, dependent on water depth. This means sound will attenuate below the threshold for disturbance relatively close to the source of sound.

392. Impacts from underwater noise generated from USBL, will represent only a very minor shift from baseline conditions, for the short duration of survey activities. Any disturbance impacts will be short lived and the behaviour of any harbour porpoise which exhibit disturbance behaviour will return to normal following cessation of USBL activities. Therefore, **no adverse effects on the FCS of harbour porpoise as a qualifying feature of the Southern North Sea SAC** (relevant for English waters) are anticipated as a result of disturbance from USBL during pre-construction survey activities for the Marine Scheme.

8.4.5. In-Combination Assessment

393. Figure 3 and Table 31 below provides a summary of the other developments with potential for in-combination effects on harbour porpoise specifically in relation to underwater noise from SBP and USBL as a result of pre-construction surveys. An explanation of the projects and plans included follows within the assessment.

Table 31 Projects for consideration for in combination impacts relevant to protected sites with diadromous fish as qualifying features

Development/ Plan	Status	Distance from Marine Scheme (km)	Description of Development/Plan	Dates of Construction (if Applicable)[28]	Dates of Operation (if Applicable)	Phase Overlap with the Marine Scheme
BBWF	In planning	0 km (direct physical overlap)	Offshore wind farm and associated grid connection infrastructure	Construction anticipated to be 2025 to 2032	Operational from 2032	Construction and operation and maintenance

8.4.5.1. DISTURBANCE FROM SBP AND USBL TO HARBOUR PORPOISE

394. As discussed in section 8.4, there is no anticipated adverse effects to the FCS for the harbour porpoise feature of the Southern North Sea SAC as a result of underwater noise from SBP or USBL associated with the pre-construction activities of the Marine Scheme. This section assesses the potential for in combination effects on harbour porpoise feature of the Southern North Sea SAC resulting from SBP and USBL along with other projects and developments.

395. Of the 24 developments identified for consideration in cumulative impacts for all potential impacts from the Marine Scheme, nine have construction timelines which have the potential to overlap with the construction phase of the Marine Scheme. Given the localised nature of works associated with the Marine Scheme, the intervening distance to the developments and their construction timelines, the Inch Cape Offshore Wind Farm, the Seagreen 1A Project and the Inch Cape OFTO have not been considered further as part of this assessment. Of the remaining six developments one is an offshore wind farm (the BBWF), four are subsea cables (EGL1; EGL3; EGL4; and EGL 2) and one is the Cambois Connection Onshore Scheme. The Cambois Connection Onshore Scheme has not been considered further as any works associated with the construction of the Landfall are not considered to generate an underwater sound profile which will result in injury or disturbance to marine mammals, particularly owing to the Applicant's commitments to adopt trenchless technology, such as HDD. Underwater sound impacts to marine mammals associated with the construction of subsea cables is considered not significant and therefore has not been considered further as part of this assessment. As such, the only development which is considered to have the potential to act in combination in terms of underwater noise from SBP and USBL on the harbour porpoise feature of the Southern North Sea SAC is the construction of the BBWF.

396. As discussed in section 8.2.4 sound emissions from SBP have the potential to result in behavioural impacts to harbour porpoise. Using a 5 km EDR radius and based on relevant species densities, it was concluded that SBP surveys are not likely to have any long-term, lasting effect on harbour porpoise.

[28] Construction programme for the Marine Scheme is anticipated to be from Q4 2026 to Q4 2029.

397. As assessed within section 8.2.4 behavioural disturbance as a result of USBL the maximum range of disturbance is estimated to be 64 m, which, considering the harbour porpoise densities in the region, equates to >0.05 individuals being affected.

398. Through the use of this disturbance criteria BBWF was able to qualify the magnitude of effect and spatial extent of disturbance. Concluding that while there is the potential for disturbance to marine mammals as a result of piling activities, the iPCoD modelling conducted by BBWF demonstrated that this is not expected to result in population consequences for any marine mammal species (BBWF, 2022).

399. Therefore, while there is the potential for cumulative underwater sound effects on marine mammals, given the BBWF piling is not anticipated to result in any population level consequences and the very low numbers of marine mammals predicted to be affected by the Marine Scheme, the chance of in combination LSE is considered low.

400. There is considered to be no risk of LSE on the FCS harbour porpoise as a qualifying feature of the Southern North Sea SAC (relevant to Scotland and England), as a result of SBP and USBL from construction activities associated with the Marine Scheme in combination with other development, plans and activities.

9. Conclusions of SAC Assessment

9.1.1. SACS with Annex I habitats as qualifying features

401. No sites were identified during HRA Screening Stage One where LSE could not be ruled out and therefore no assessment was carried out in the RIAA, as endorsed by the formal consultation on the HRA Screening Stage One report with Natural England.

9.1.2. SACs with diadromous fish and associated features as qualifying features

402. HRA Screening identified six SACs with diadromous fish and associated features as qualifying, where LSE could not be ruled out, these sites were taken forward for assessment. The only pathway for assessment was EMF during the operation and maintenance phase of the Marine Scheme. A project alone and in-combination assessment was undertaken which concluded that no adverse effects on the FCS of Atlantic salmon, river lamprey or sea lamprey as qualifying features of the River Tay SAC, River Teith SAC and River Tweed SAC would occur as a result of EMF during the operation and maintenance phase of the Marine Scheme, no adverse effects on the FCS of sea lamprey and river lamprey as qualifying features of the Tweed Estuary SAC and no adverse effects on the FCS of Atlantic salmon and freshwater pearl mussel as qualifying features of the River South Esk SAC and River Dee SAC.

403. To conclude no adverse effects on site integrity of either the Tweed Estuary SAC or the River Tweed SAC is anticipated as a result of the Marine Scheme. To confirm this assessment is relevant for both Scotland and England.

9.1.3. SACs with marine mammals as qualifying features

404. HRA Screening identified two SACs with marine mammals as qualifying features where LSE could not be ruled out (Berwickshire and North Northumberland Coast SAC for grey seals and Southern North Sea for harbour porpoise). Screening advice from NatureScot detailed that the Southern North Sea did not need to be assessed for Scotland and therefore this site was assessed in English waters, per advice from SNCBs during pre-application (as detailed in section 4).

405. The only pathway assessed was underwater noise from pre-construction activities (specifically SBP and USBL). No injury and minimal disturbance are predicted for both SBP and USBL for both harbour porpoise and grey sea and as such no FCS was predicted for either species.

406. To conclude no adverse effects to the site integrity of the Berwickshire and North Northumberland Coast SAC is anticipated as a result of the Marine Scheme. This assessment is relevant to both Scotland and England.

407. No adverse effects to the site integrity of the Southern North Sea SAC are anticipated as a result of the Marine Scheme. This assessment is relevant to England only.

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