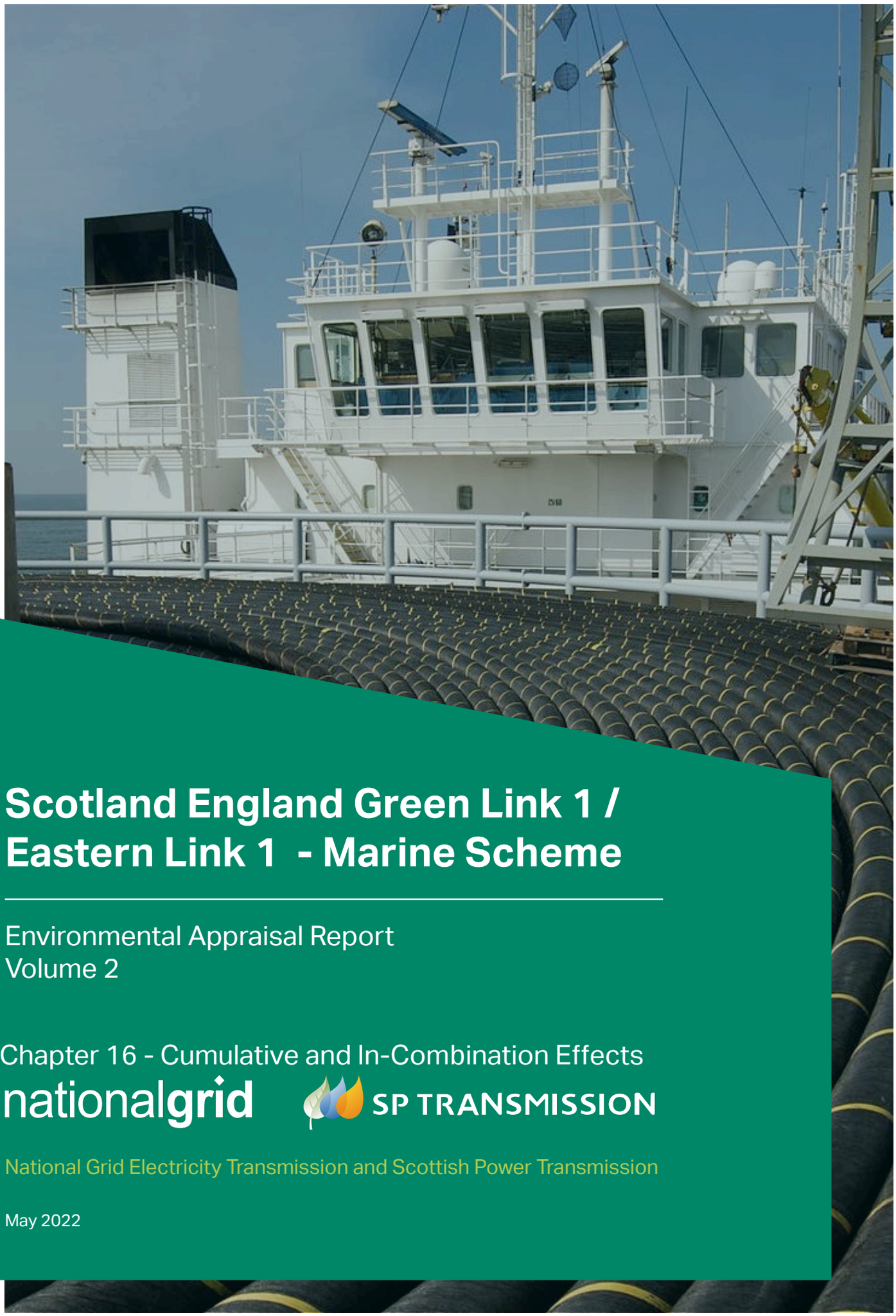

Scotland England Green Link 1 / Eastern Link 1 - Marine Scheme

Environmental Appraisal Report
Volume 2

Chapter 16 - Cumulative and In-Combination Effects

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16. Cumulative and In-Combination Effects

16.1 Introduction

This chapter of the Environmental Appraisal Report (EAR) reports the appraisal of cumulative and in-combination effects arising from the Marine Scheme. The general approach to the cumulative appraisal is described in Section 4.5 of Chapter 4: Approach to Environmental Appraisal.

The cumulative effects appraisal of the Marine Scheme considers the following types of effect:

- **Cumulative Effects:** These effects, sometimes referred to as inter-project effects, derive from scheme-specific impacts which, when considered together with the impacts of other planned developments, could result in a new or different significant effect or an effect of greater significance than the scheme's effect when considered in isolation; and
- **In-Combination Effects:** These effects, sometimes referred to as intra-project effects, derive from combinations of different scheme-specific impacts which, when acting together on the same receptor, would result in a new or different likely significant effect(s) or an effect of greater significance than one impact would result in when considered in isolation.

The appraisal has been based on the best available data from other plans, projects, marine activities, and associated information that is currently in the public domain or has been provided to the Marine Scheme. The appraisal assumes that publicly available information is accurate and has relied on collaboration with a range of statutory consultees to the Marine Licensing process, neighbouring authorities, and other developers to identify any changes in information that may be pertinent to the appraisal. It has also been tailored to the feedback received during scoping, more information is provided in Section 16.3.2.

16.2 Legislation, policy and guidance

16.2.1 Legislation

There is no overarching legislative requirement to consider cumulative effects, as this appraisal is non-statutory.

However, the Marine Policy Statement (MPS) (HM Government 2011) set outs the following in regard to cumulative effects:

'when considering potential benefits and adverse effects, decision makers should also consider any multiple and cumulative impacts of proposals in the light of other projects and activities'

There is also a requirement to consider cumulative effects under Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended) ('the Habitats Regulations):

"63.(1) A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which

(a) is likely to have a significant effect on a European site or a European offshore marine site (either alone ***or in combination with other plans or projects****), and*

(b) is not directly connected with or necessary to the management of that site,

must make an appropriate assessment of the implications of the plan or project for that site in view of that site's conservation objectives."

and Regulation 48 of the Conservation (Natural Habitats &c.) Regulations 1994 (as amended) in Scotland which states that:

"48.(1) A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which–

(a) is likely to have a significant effect on a European site in Great Britain (either alone or in combination with other plans or projects), and

(b) is not directly connected with or necessary to the management of the site,

shall make an appropriate assessment of the implications for the site in view of that site's conservation objectives."

Consideration of in-combination effects in the context of the Habitats Regulations is given in EAR Volume 3 Appendix 8.2: Habitat Regulations Assessment Report.

16.2.2 Policy

Both Scottish and English marine plans state the importance of identifying and mitigating cumulative effects during planning of development.

Scotland's National Marine Plan (Scottish Government, 2015) states, in policy GEN21:

"Cumulative impacts affecting the ecosystem of the marine plan area should be addressed in decision making and plan implementation."

The North East Inshore and North East Offshore Marine Plan (HM Government, 2021) states, in policy NE-CE-1:

"Proposals which may have adverse cumulative effects with other existing, authorised, or reasonably foreseeable proposals must demonstrate that they will, in order of preference:

a) avoid

b) minimise

c) mitigate
- adverse cumulative and/or in-combination effects so they are no longer significant."

The UK Marine Policy Statement (HM Government, 2011) is the framework for preparing Marine Plans and taking decisions affecting the marine environment. It states that when considering potential benefits and adverse effects, decision makers should consider any multiple and cumulative impacts of proposals, in the light of other projects and activities. The guidance also states that:

"The marine plan authority will need to consider the potential cumulative impact of activities and, using best available techniques, whether for example:

- *The cumulative impact of activities, either by themselves over time or in conjunction with others, outweigh the benefits;*
- *A series of low impact activities would have a significant cumulative impact which outweighs the benefit; or,*
- *An activity may preclude the use of the same area/resource for another potentially beneficial activity*."

16.2.3 Guidance

In addition to the UK Marine Policy Statement, the following guidance has been used to inform the scope of the cumulative and in-combination effects appraisals, and to assist the identification and mitigation of likely significant effects:

- **Cumulative Effects Assessment – Advice Note Seventeen**: Guidance on cumulative effects assessments relevant to nationally significant infrastructure projects. Although the Marine Scheme is not defined as a nationally significant infrastructure project, the approach set out in this guidance can be applied to a range of project types. This guidance has been applied when undertaking a staged process of identification and appraisal of other planned developments within the appraisal of cumulative effects (PINS, 2019);

- **A Strategic Framework for Scoping Cumulative Effects**: A framework for assessing cumulative effects of marine activities across the strategic, regional, and individual project level (MMO, 2014); and
- **Consenting and Licensing Guidance: For Offshore Wind, Wave and Tidal Energy Applications**: Guidance on applying for consents and marine licences for offshore renewable energy projects within both Scottish Territorial and Offshore Waters (Marine Scotland, 2018). Again, the Marine Scheme is not related to an offshore wind, wave or tidal energy application, but aspects of the guidance can be applied.

The approach to the assessment of cumulative and in-combination effects appraisal is based on the guidance noted above which was provided for comment during non-statutory Scoping.

16.3 Approach to the Cumulative Appraisal and Data Sources

16.3.1 Appraisal Methodology

16.3.1.1 Cumulative Effects

In accordance with the approach contained within Advice Note Seventeen (PINS, 2019), the following stages were followed when carrying out the cumulative appraisal:

- Stage 1: Establishing the Long List of Other Developments;
- Stage 2: Establishing the Short List of Other Developments;
- Stage 3: Information gathering; and
- Stage 4: Assessment.

Stage 1: Long List of Other Developments

PINS (2019) recommends that to identify a long list of other development likely to result in significant cumulative effects, the spatial and temporal impacts of a project are first determined. The Zone of Influence (ZoI) for each environmental aspect considered within the EAR of the Marine Scheme is presented in Table 16-1.

Table 16-1: Zones of Influence

Environmental Topic	Maximum ZOI	Zone of Influence
Physical Environment	1.4 km	• Suspended Sediment Concentrations (SSC): Coarse materials in the sediment plume will redeposit at seabed within 200 m from the marine installation corridor; • SSC: Any fine sands will settle on the seabed up to 1.4 km from the point where it is mobilised; and • SSC: Silt-sized material in the sediment plume will remain in suspension for several days and therefore travel significant distances, redepositing at the seabed within 3.4 km of the marine installation corridor. Refer to Chapter 7: Physical Environment, Table 7-14.
Benthic Ecology	10 km	• Zones of influence for benthic habitats: 10 km corridor centred of the marine installation corridor (this study area has been selected to encompasses all likely ZOI for benthic habitats and species); and • No activities will be undertaken in the intertidal environment due to employment of HDD, and hence no impact pathways to affect intertidal benthic ecology have been scoped into the appraisal in Chapter 8: Benthic Ecology.
Fish and Shellfish	1 km	• Temporary physical disturbance during route preparation: 25 m footprint; • Permanent habitat loss during route preparation: the footprint of rock protection and/ or concrete mattressing on the seabed; and

Environmental Topic	Maximum ZOI	Zone of Influence
		• Temporary increase in suspended sediment: 1.4 km from the marine installation corridor.
Marine Mammals	Greater North Sea Ecoregion	• The ZoI for marine mammals encompasses the Greater North Sea Ecoregion[1] and recognises the highly mobile and transient nature of marine mammal species and the potential implications of local impacts on wider species populations.
Ornithology	1 km	• Disturbance from cable installation vessels: 1 km ZoI from the marine installation corridor has been applied for all bird species.
Marine Archaeology	0 km (spatial extent of the Marine Scheme)	• Given the highly localised nature of direct impacts on marine archaeological receptors, the ZoI for cumulative appraisal is considered to be the spatial extent of the Marine Scheme within UK waters; and • Indirect impacts relating to burial of marine archaeological assets (see ZoI for Physical Environment).
Shipping and Navigation	10 NM (18.52 km)	• Vessel navigation routes within, crossing, or directly affected by the Marine Scheme: Within 10 Nautical Miles (NM) of the marine installation corridor.
Commercial Fisheries	80 km	• The ICES rectangles within which the Marine Scheme is located: – ICES rectangle 40E7: Located in Scottish waters, encompasses the northern section of the marine installation corridor including the area around the Scottish landfall. – ICES rectangle 40E8: Encompasses a small section of the marine installation corridor in Scottish waters and part of the cable installation corridor in English waters; and – ICES rectangles 39E8 and 38E8: Located in English waters, cover the southern part of the marine installation corridor. ICES rectangle 38E8 includes the area around the English landfall. • The furthest point (in 40E8) is located approximately 80 km north-east of the marine installation corridor.
Other Sea Users	10 km	• Temporary disturbance to marine recreational users and vessel routeing in shallow waters: 10 km from marine installation corridor (defined by the extent to which other sea users may be directly or indirectly impacted by the Marine Scheme); • Temporary disturbance to vessel routeing in deep waters and access to other sea user working areas: 500 m from marine installation corridor; and • Damage to or interference with a third-party cable or pipeline asset: the marine installation corridor.

The largest ZoI used in the technical topics for the Marine Scheme is 10 km, with the exception of marine mammals and commercial fisheries. The ZoI for marine mammals and commercial fisheries is greater than 10 km (see Table 16-1), however the number of projects within these larger ZoI may have led to a disproportionate level of appraisal. It was therefore decided to test the potential for cumulative effects with other major projects within 20 km and also those more distant projects that stakeholders requested were included in the cumulative effects appraisal. If significant cumulative effects were identified the appraisal would be extended to more distant projects; however if cumulative effects were found not to be significant it was considered unnecessary to extend the appraisal beyond 20 km.

However, where a large-scale development has been identified outside of 20 km and at this stage of the appraisal cumulative effects cannot be discounted, or where stakeholders have requested their inclusion, the development has been included in the list as a precautionary measure.

[1] The Greater North Sea ecoregion includes the North Sea, English Channel, Skagerrak, and Kattegat

The long list of other developments, taking account of this spatial extent, were agreed at the non-statutory Scoping and updated using the data sources listed in Section 16.3.3. These are presented in Section 14.4.1 in Table 16-3.

Stage 2: Shortlisting of Cumulative Appraisal

The developments presented in Table 16-3 were screened to identify their potential for cumulative effects with the Marine Scheme, based upon the available information which has been gathered for each development at the time of the appraisal being undertaken. This screening considered the nature and scale of the development, and potential temporal and/ or spatial interactions with receptors affected by the Marine Scheme within the ZoI. Any developments where installation activities may coincide with the timescales of the Marine Scheme were included.

Where potential spatial and temporal overlaps were considered possible, the specific receptors that fall within the area of overlap were identified. If the receptors identified were considered to be sensitive to the impact under consideration, the overlapping development was taken forward into the cumulative appraisal.

Stage 3: Information Gathering

Detailed information gathering of the shortlisted developments was undertaken to find details of their likely environmental effects and programme so to determine their potential for cumulative effects with the Marine Scheme. This information has been primarily obtained from documentation submitted as part of planning / marine licence applications or used in the appraisals for site allocations. Information gathered for each development included (where available) the design of the development, its location, the expected timelines, and likely environmental effects.

Stage 4: Assessment

Each of the shortlisted developments identified during Stage 2 were appraised as to whether cumulative effects may arise. For each ‘other development,’ a matrix has been used to identify potential environmental impact pathway interactions between the Marine Scheme and the ‘other development’. The pathways are then either included or excluded from further appraisal. Those included are specifically appraised to identify any potential likely significant cumulative effects. For the purposes of this appraisal, cumulative effects that elevate the significance of the individual effects are the focus, for example where two minor effects accumulate to create a moderate cumulative effect.

Mitigation measures have been identified, where necessary, in relation to significant adverse cumulative effects. Consideration has been given where possible to the relative contribution of different projects to the cumulative effect and to where it may be reasonable to propose shared mitigation.

16.3.1.2 In-Combination Effects

The appraisal of in-combination effects considers whether a single environmental receptor or resource would likely be affected by more than one type of impact as a result of the installation, operation and decommissioning phases of the Marine Scheme. The appraisal methodology involved the identification of impact interactions associated with the Marine Scheme upon separate environmental receptors and resources, in order to understand the overall environmental effect of the Marine Scheme.

Potential interactions have been identified by reviewing the topic conclusions within technical appraisal chapters of this EAR, in order to establish where individual impacts may combine and result in likely significant effects.

The significance of in-combination effects upon environmental receptors and resources has been determined using professional judgement.

16.3.2 Summary of Consultations

A non-statutory scoping report, submitted to and consulted on by the Marine Management Organisation (MMO) and Marine Scotland Licensing Operations Team (MS-LOT), with responses received in June 2021, identified aspects of the Marine Scheme that have the potential to create cumulative effects

during the installation, operation (including maintenance and repair) and decommissioning phases. Their feedback on the proposal and EAR scope has been considered in this chapter, refer to Table 16-2.

Further details of the consultation process and associated responses are presented in Chapter 6: Consultation and Stakeholder Engagement.

In addition, engagement with developments in proximity of the marine installation corridor, including those which require crossing agreements or proximity agreements, was undertaken by the project team during design stage.

Table 16-2: Scoping Report Consultation

Consultee	Consultee response/ comment	How and where addressed
NatureScot	We agree with the proposed approached for the development of this proposal and would expect to see the offshore wind developments in the outer Firth of Forth included into the list of 'other existing development and/ or approved development' and their export cables.	Whilst the offshore wind development sites in the outer Firth are located outside the cumulative appraisal Zone of Influence (ZoI), the export cables for Seagreen 1, Neart Na Gaoithe, and Berwick Bank have been included in the long list (Table 16-3).
East Lothian Council	Cumulative impact with other development should be considered, in particular other development in the area. This includes the Neart Na Gaoithe cable connection, currently under construction, and Berwick and Marr Bank connections, which are in Scoping. There are also sea defence works at Dunbar which may be relevant for coastal processes.	The export cables for Neart Na Gaoithe and Berwick Bank have been included in the cumulative appraisal long list (Table 16-3), as has the sea defence scheme at Dunbar East Beach.
East Lothian Council	National Planning Policy 3 includes high voltage transmission infrastructure as National Development 4 and anticipates connections to offshore wind farms. It also includes an Area of Coordinated Action between Cockenzie and Torness. Annex A to NPF3 includes a statement on National Development 4, which states "We want developers to work together to minimise the number and impacts of these developments by combining infrastructure where possible." This is reflected in East Lothian Local Development Plan Policy EGT3, which requires infrastructure to be combined where possible. The reason for this is to reduce environmental impact. The Report should therefore show what consideration has been had to combining infrastructure with other proposals in the area.	Consideration has been given to combining the Project infrastructure with other developments. SP Energy Networks are working closely with SSE Renewables on their Berwick Bank Offshore Windfarm (OWF) project. The proposed Branxton substation provides the point of connection onto the transmission network for the OWF. The Eastern Link and Berwick Bank OWF are two separate projects with different consenting requirements, programmes, and approaches to routeing and siting. Both SP Energy Networks and SSER have discussed site options in detail during their options appraisal work. SP Energy Network's Branxton substation meets the requirements of Policy EGT3 as it seeks to combine infrastructure by providing the point of connection onto the transmission network for the Eastern Link project as well as the Berwick Bank OWF. This means that only one new substation is required to connect both the Eastern Link and the Berwick Bank OWF onto the transmission network.
MMO	Underwater Noise: An assessment of the cumulative noise impacts of the cable laying activities with other activities in the North Sea on marine mammals should be considered. The potential effect ranges need to be modelled using appropriate noise exposure criteria. 11.2 Any proposed noise mitigation and monitoring needs to be outlined.	Cumulative underwater sound effects upon marine mammals attributed to the Marine Scheme in combination with other plans and projects, plus any proposed mitigation, is outlined in Section 16.4.4.4.

Consultee	Consultee response/ comment	How and where addressed
MMO	It is noted that Section 11.6.3 includes a description of potential cumulative impacts, which acknowledges the impact of multiple small-scale effects from different projects over the resources as a whole, or larger features like palaeolandscape features. This should be explored within the Environmental Appraisal Report.	Cumulative effects upon marine archaeology attributed to the Marine Scheme in combination with other plans and projects, plus any proposed mitigation, is outlined in Section 16.4.4.6.
Scottish Fisheries Federation (SFF)	In 14.2.2 regarding the other cables, there needs to be included Inchcape and Seagreen 1A, or there is no complete picture of the potentially compromised grounds.	Inchcape and Seagreen 1A have been considered in the long list of 'other development' and has subsequently screened out of the short list due to the location of these projects (approximately 22 km from the Marine Scheme). However, these have been included in the commercial fisheries' cumulative effects appraisal in Section 16.4.4.8 as it is recognised that there is potential for cumulative effects for fishing associated with the operational phase of these projects and the operation of the Marine Scheme, predominantly the increased permanent loss of fishing grounds associated with the presence of cable protection and fishing gear snagging risk.

16.3.3 Data Sources

In line with the guidance identified above, and in order to achieve a focused appraisal, it is necessary to include details of third-party projects only where there may be receptor or activity-based pressures.

Projects and project types considered within the cumulative appraisal include, but are not limited to:

- Onshore components of Scotland England Green Link 1/ Eastern Link 1;
- Offshore windfarms and associated cables;
- Other cables and pipelines;
- Oil and gas infrastructure;
- Carbon capture, utilisation and storage;
- Marine Aggregate Sites (including areas identified as having large-scale potential for marine aggregate extraction);
- Licensed Disposal Sites;
- Coastal energy; and
- Coastal protection.

Data on these and other projects, plans, and activities have been established through desktop review of published information from the following sources:

- MMO Public Register (2022);
- MS-LOT Public Register (Marine Scotland, 2022);
- KIS-ORCA Marine Cables Information (2022);
- National Infrastructure Planning website (2022);
- The Crown Estate website (TCE, 2022);
- The Crown Estate Scotland website (2022);
- Department for Business, Energy, and Industrial Strategy (BEIS) Oil and Gas Asset Map (OGA, 2022);

- Development websites, such as Seagreen Windfarm Project website (https://www.seagreenwindenergy.com/) (2022) and Berwick Bank Project website (https://www.berwickbank.com/.)

16.3.4 Data Gaps and Limitations

The data is subject to the following limitations and/ or assumptions:

- Given the timeframes for the Marine Scheme, the information for some other projects (such as timescales and detailed construction information) is not available at the stage when this EAR was finalised. A 'watching brief' was maintained on these sources as the Marine Scheme progressed through the environmental appraisal process, such that the most appropriate level of information has been used for the appraisal at the time of submission;
- Where information was not available, but an assumption of the spatial extent of an impact could be inferred based on expert knowledge, these projects have been taken forward for appraisal;
- Where there was limited information or not enough certainty to carry out the cumulative appraisal, these projects have been scoped out. It should be noted that best efforts have been made to either source publicly available information or contact appropriate developers prior to the decision to scope out a project based on lack of information. This process is in line with the guidance (MMO, 2014) and ensures that only cumulative effects for which there is a high degree of confidence are appraised; and
- Third party and publicly available data is correct at the time of publication of the EAR.

16.4 Appraisal of Cumulative Effects

16.4.1 Long List of Other Developments

Table 16-3 presents the long list of other developments. It should be noted that the Blyth Offshore Demonstrator Array 2 (Phase 1), the Blyth Offshore Demonstrator Array 3a (Phase 3) and the NO-UK Fibre Optic Cable System and Havhingsten Segment 2.1 North, North Tyne Dredging Disposal Site and Souter Point (Outer) Dredging Disposal Site have not been included in the long list of other developments as shown in the Marine Scheme scoping report. These other developments are now operational and have been considered as part of the environmental baseline in the EAR.

Table 16-3: Long List of Other Developments to be Considered within the Cumulative Appraisal

Project	Owner	Status	Distance to the Marine Scheme Corridor
Other Components of Scotland England Green Link 1/ Eastern Link 1			
Scotland England Green Link/ Eastern Link 1 Onshore Components (Scotland)	SPT	Pre-planning	0 km at KP 0 Overlap between Mean High Water Spring (MHWS) and Mean Low Water Spring (MLWS)
Scotland England Green Link/ Eastern Link 1 Onshore Components (England)	National Grid	Pre-planning	0 km at KP 176 Overlap between MHWS and MLWS
Offshore Windfarms and Associated Cables			
Inch Cape Offshore Wind Farm	Inch Cape Offshore Limited	Consented. The installation and commissioning of inter-array cabling is expected to be completed in 2023.	The export cable is 22 km north of marine installation corridor KP 1.
Neart Na Gaoithe Offshore Wind	Neart Na Gaoithe Offshore Wind (EDF)	Under construction. Full commissioning will complete in 2024.	Export cable only: approximately 1.2 km north of KP 1.

Project	Owner	Status	Distance to the Marine Scheme Corridor
Berwick Bank Offshore Wind Farm	SSE	Currently at the Scoping stage, Scoping Report submitted in October 2021. Estimated to begin construction in 2025	Export cable only: approximately 2.3 km north-west of marine installation corridor at its closest (which is at the landfall)
SG1A Transmission Asset (for Seagreen 1 Offshore Windfarm)	TotalEnergies and SSE Renewables	Consented. Expected to be fully operational by early 2023	The export cable is 22 km north of KP 1.
Blyth Offshore Demonstrator Array 3a (Phase 3)	Blyth Offshore Demonstrator Limited	Array 3a is no longer being developed under the Phase 1 and 2 consent.	10.5 km west of KP 131
Blyth Offshore Demonstrator Array 4 (Phase 2) Marine Licences and Applications: *MLA/2012/00122/10, Variation 10*	Blyth Offshore Demonstrator Limited	Commenced project planning. Target to be fully commissioned by 2025.	5 km west of KP 137
Other Cables and Pipelines			
Havhingsten Segment 2.1 South Marine Licences and Applications: *MLA/2019/00425*	AQUA COMM	Proposed (Marine Licence in progress). It should be noted that no clear timescales for Havhingsten Segment 2.1 South could be found.	0 km Crosses at KP 141 to KP 142
Oil and Gas Infrastructure			
None			
Marine Aggregate Sites			
None			
Licenced Disposal Sites			
None			
Coastal Energy			
Marine Licences and Applications: MS-00008819 for routine maintenance activities	Torness Power Station	Marine licence issued in 2020 for Cooling Water System (CWS) maintenance and other routine or emergency maintenance. Licence is valid until 2030.	Approximately 2.2 km north of KP 1.
Northumberland Energy Park, Phases 1-3	Energy Central	Phase 1 was due to be completed Summer 2021. Phase 2 and 3 are predominantly onshore works.	Approximately 20 km west of KP 38.
Coastal Defences			
Construction of Sea Defences – Dunbar East Beach	East Lothian Council	Application submitted in December 2018, and a proposed completion date March 2020. Application is still in 'pre-application' stage.	9.5 km north-west of KP 1

16.4.2 Shortlisting 'Other' Developments

The following developments were screened out either due to that fact that their construction locations are outside the 20 km identified as the study area for the cumulative effects appraisal or their construction programmes are outside the programme for the installation of the Marine Scheme. It should be noted that those developments screened out marked with a '*' may have impacts in the operational phase for commercial fishing associated with the increased permanent loss of fishing grounds associated with the presence of cable protection and fishing gear snagging risk. Section 16.4.4.8 therefore also considers these projects.

- **SG1A Transmission Asset (for Seagreen 1 Offshore Windfarm)***: It is expected to be fully operational by 2023, before the commencement of works associated with the Marine Scheme;
- **Inch Cape Offshore Wind Farm***: As this scheme is located approximately 22 km north of the Marine Scheme, there is unlikely to be a significant cumulative impact. It is also expected to be fully operational by 2023, before the commencement of works associated with the Marine Scheme;
- **Neart Na Gaoithe Offshore Wind***: Offshore construction of the project is proposed to commence in Summer 2020 and is anticipated to be complete and operational by 2023 (NnG Offshore Wind, 2021). Therefore, by the time construction of the Marine Scheme commences, Neart Na Gaoithe should be operational. There is negligible risk that construction, operation and maintenance, or decommissioning of the Marine Scheme could occur at the same time as maintenance or decommissioning activities associated with Neart Na Gaoithe;
- **Blyth Offshore Demonstrator Array 3a (Phase 3)**: The entire Blyth Offshore Demonstrator site was consented under Section 36 of the Electricity Act 1989 as an offshore generating station with a generating capacity of between 1 and 100MW. Phase 1 (Array 2) is operational and has a capacity of up to 41.5 Megawatt (MW), whilst Phase 2 (Array 4) is consented with a capacity of up to 58.4 MW; combined, they have a capacity of 99.9 MW. In the application for a variation to marine licence and Section 36 (S.36) variation application for Phase 2, it is stated that Array 3a will not be developed under this consent variation. There is potential for a further application to be made, but no information has been made publicly available;
- **Torness Power Station: Marine Licence MS-00008819 for routine maintenance activities**: The only impact pathway which has the potential to interact with the Marine Scheme and routine maintenance activities at Torness Power Station is the increase in suspended sediment concentrations. This impact is spatially limited to a maximum of 1.4 km and Torness Power Station is located greater than 2 km from the Marine Scheme; and
- **Northumberland Energy Park, Phases 1-3:** Phase 1 was completed in 2021. Phase 2 and 3 are predominantly onshore works and do not have potential impact pathways that could interact with Marine Scheme.

A total of six 'other developments' have been shortlisted for inclusion in the appraisal of cumulative effects and these are presented in Table 16-4 and Figure 16-1.

Table 16-4: Shortlisted Developments to be included in Cumulative Appraisal

Project Name	Description	Timescale
Scotland England Green Link/ Eastern Link 1 Onshore Components (Scotland) (Landfall infrastructure only)	The Scottish Onshore Scheme will connect to the Marine Scheme at the interface between MHWS and MLWS at Thorntonloch Beach, East Lothian. The converter station, located in the Torness area, will connect to the landfall via 7.5 km of buried cable, and to the new 400 kilovolt (kV) substation, located in Branxton, via approximately 5 km of High Voltage Alternating Current (HVAC) cable. The application has been submitted to East Lothian Council under the Town and Country Planning (Scotland) Regulations 1997. The converter station and HVDC/HVAC cables associated with the Scottish Onshore Scheme have not been considered in the cumulative appraisal; only the landfall infrastructure is considered to have any potential for cumulative effects.	It is anticipated that installation of the landfall infrastructure will occur between late 2025 and early 2027 (SP Energy Networks, 2021).
Scotland England Green Link/ Eastern Link 1 Onshore Components (England) (Landfall infrastructure only)	The English Onshore Scheme will connect to the Marine Scheme at the interface between MHWS and MLWS north of Seaham, County Durham. The converter station, located at Hawthorn Pit will connect to the landfall via approximately 10 km of underground HVDC cable, and to the new 400 kV substation via approximately 1 km of HVAC cable. The application has been submitted to Durham County Council under the Town and Country Planning Act 1990. The converter station and HVDC/HVAC cables associated with the English Onshore Scheme have not been considered in the cumulative appraisal; only the landfall infrastructure is considered to have any potential for cumulative effects.	It is anticipated that construction of the landfall infrastructure will commence in Spring 2025 and complete in early 2027 (English Onshore Scheme EAR Chapter 3: Description of the EOS).
Berwick Bank Offshore Wind Farm (Export cable only)	In 2021, it was announced that Berwick Bank and Marr Bank wind farms have merged and would continue to operate under the 'Berwick Bank' name (NS Energy Business, 2021). The consolidated Berwick Bank Offshore Wind Farm will deliver up to 4.1 Gigawatt (GW) of installed capacity (SSE, 2020). Located in the Firth of Forth, approximately 43 km off the coast of East Lothian, the undersea cables will make landfall at Skateraw, approximately 2.3 km north-west of the marine installation corridor at KP 1. As such, only the export cable will be included in the cumulative appraisal, as the wind farm site is located outside the cumulative study area and unlikely to result in significant cumulative effects.	The Berwick Bank Offshore Wind Farm is estimated to begin operations after 2025 (SSE Renewables, n.d.)
Blyth Offshore Demonstrator Array 4 (Phase 2)	This forms part of EDF Renewables' Blyth Offshore Demonstrator, which is located 5 km north-west of Phase 2, further inshore than the marine installation corridor at KP 131 to KP 136. Array 4 (Phase 2) has been consented under a variation to the original marine licence application for five additional turbines with a capacity of up to 58.4 MW. The exact configuration is still to be determined. This is is a floating wind farm and will not have any fixed foundation turbines. The floating platforms and turbines will be built at the quayside and towed to site and will not rely on many vessels or specialised vessels.	The proposed wind farm is targeting to be fully commissioned by 2025, which will coincide with the installation of the marine installation corridor.
Havhingsten Segment 2.1 South	The Havhingsten cable system, also called North Sea Connect, is a planned subsea telecommunication network between the UK and Denmark. Havhingsten Segment 2.1 North comes to shore at Seaton Sluice, Northumberland, intersecting the Marine Scheme between KP 137 and KP 138, and was ready for service at the end of 2020. Havhingsten Segment 2.1 South comes to shore at Whitley Bay, Northumberland, approximately 4.5 km south of Seaton Sluice, is a 'stubbed cable route[2]'; this will be installed but not immediately connected to the telecommunications network (Intertek, 2019b). A proposed installation date has not been published. It is intended that the stubbed cable route will be extended within 10 years of completion of the Havhingsten installation project. It should be noted that no clear timescales for Havhingsten Segment 2.1 South could be found.	There is no clear timescale. When the Marine Licence application was submitted in June 2019, it was intended that the project would be operational in Q1 2020, but the status of the application is still 'In Progress.'

[2] A stubbed cable route has a junction with another cable route which break apart to reach separate landfalls.

Project Name	Description	Timescale
Dunbar East Beach Sea Defence	East Lothian Council is proposing the construction of a seawall defence project to promote the natural regeneration of Dunbar East Beach. The works are to repair/ replace an existing groyne at the south of the site that has fallen into disrepair alongside works to improve the exposure conditions in the bay to encourage any sediment that is in the local system to remain on the foreshore. Materials will be delivered to site by road and the foreshore will be accessed using an existing ramp at the south end of the beach. All works will be undertaken using land-based plant and so works will be undertaken when tides allow access. In the application to Marine Scotland, there was a proposed construction completion date of March 2020 (Marine Scotland, 2018a); however, the project is currently in 'pre-application' stage and the works have not yet commenced.	Timescales are unclear but likely to occur in the next five years.

GIS: LC Checked: SCN Approved: FF

Numbered unitary areas:
1 RENFREWSHIRE
2 EAST RENFREWSHIRE
3 GLASGOW CITY
4 NORTH LANARKSHIRE
5 CITY OF EDINBURGH

Berwick Bank

Berwick Bank Export Cable

Neart na Gaoithe Export Cable

Dunbar East Beach Sea Defence

SEGL1 Onshore Component (Landfall) Scotland

Blyth Demonstration Array 4 (Phase 2)

Havhingsten Segment 2.1 South

SEGL1 Onshore Component (Landfall) England

10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170

Kirkcaldy
Burntisland
Aberlady
EDINBURGH
Tranent
EAST LOTHIAN
Haddington
East Linton
Dalkeith
MIDLOTHIAN
Loanhead
Gorebridge
Grantshouse
Eyemouth
St Abb's Head
Duns
Berwick-upon-Tweed
Holy Island
Greenlaw
Lauder
Norham
Coldstream
Etal
Belford
Seahouses
Wooler
Galashiels
Peebles
Innerleithen
Melrose
Kelso
Selkirk
SCOTTISH BORDERS
Jedburgh
Hawick
Alnwick
Longhoughton
Amble
Rothbury
NORTHUMBERLAND
Morpeth
Bedlington
Newbiggin-by-the-Sea
Blyth
Whitley Bay
NEWCASTLE UPON TYNE
NORTH TYNESIDE
Tynemouth
SOUTH TYNESIDE
South Shields
SUNDERLAND
Sunderland
Seaham
Peterlee
HARTLEPOOL
Durham
Consett
Chester-le-Street
Washington
GATESHEAD
Gateshead
Corbridge
Hexham
Haltwhistle
Brampton
Carlisle
Wetheral
Longtown
Gretna
Langholm
Lockerbie
Bellingham
Kielder Water
Alston
Wearhead
Tow Law
Crook
Bishop Auckland
COUNTY DURHAM
Lazonby
Bothel
Wigton
Dalston
Bassenthwaite
Rothbury
Isle of May
FIRTH OF FORTH
R Tweed
R Teviot
R Esk
R North Tyne
R South Tyne
R Tyne
R Eden
R Wear

N

0 25 50 km

Scale @ A3 1:600,000

Coordinate System: WGS1984 Zone 30N

nationalgrid
SP TRANSMISSION

PROJECT
Scotland England Green Link 1 / Eastern Link 1

KEY
- Marine Installation Corridor
- 20km Study Area
- Kilometre Point (KP)
- UK Territorial Sea Limit
- Scottish/English Water Border

Cumulative Development Type
- SEGL1
- Cable
- Sea Defence
- Wind Farm
- Wind Farm Export Cable

TITLE
Figure 16-1
Cumulative Schemes

REFERENCE
SEGL1_M_EAR_16-1_v5_20220504

SHEET NUMBER
1 of 1

DATE
04/05/2022

16.4.3 Impacts Excluded from Cumulative Appraisal

Table 16-5 presents the impacts excluded from cumulative appraisal and the reasoning for their exclusion.

Table 16-5: Impacts Excluded from Cumulative Appraisal

Impact	Reason for exclusion
Routine planned maintenance work	The cable system is designed to avoid the need for routine planned maintenance work on the cables or their associated infrastructure during the lifetime of the Marine Scheme. The cumulative appraisal assumes that any maintenance and repair work associated with the Marine Scheme would be sporadic, temporary, and highly localised. Therefore, any disturbance would be highly unlikely to interact with similar effects resulting from other projects during either their construction or maintenance.
Works in the intertidal zone	There will be no works in the intertidal zone because Horizontal Directional Drilling (HDD) will be used to install cable between an area inland of MHWS and the HDD breakout which will be below MLWS. This will prevent any direct impacts on intertidal receptors.
Discrete marine archaeological sites and unknown sites	Discrete marine archaeological sites and unknown sites encountered by chance during installation, will be localised and therefore interactions with effects from other developments and activities in the area are highly unlikely to occur.
Drilling fluids	The release of drilling fluid required for the HDD operations, at the nearshore breakout points at Torness (Scottish landfall) and Seaham (English landfall) in proximity to the Scotland England Green Link (SEGL1)/ Eastern Link 1 (EL1) Onshore Schemes has some potential to alter water quality affecting fish and shellfish ecology, either directly or indirectly. Best practice methods have been applied within the appraisals for Chapter 8: Benthic Ecology, Chapter 9: Fish and Shellfish and Chapter 11: Ornithology, and drilling fluids will be selected from the Centre from Environment, Fisheries, and Aquaculture Science (Cefas) approved list of drilling fluids, and the OSPAR List of Substances/Preparations Used and Discharged Offshore which are Considered to Pose Little or No Risk to the Environment (PLONOR). Industry standard drilling fluids and additives which are required during the HDD operations, are biodegradable. Furthermore, residual small-volume releases would be expected to be diluted rapidly. As such, it is considered that cumulative impacts surrounding water pollution during cable installation and any required maintenance would be rare and not significant.
Noise emissions	No noise emissions are expected from the operating cable.
Other development decommissioning	It is currently unknown if any other development or decommissioning will be occurring at the same time as the Marine Scheme's decommissioning activities. The cumulative effects cannot be defined without knowing which other operations will be occurring during the decommissioning phase of the Project.

16.4.4 Cumulative Effects Appraisal of Shortlisted Developments

This section presents the appraisals of cumulative effects between the Marine Scheme and the shortlisted developments for each technical chapter of this EAR. The potential for cumulative effects is summarised in Table 16-15.

For the purposes of the cumulative effects appraisal, it was generally considered that the potential for cumulative effects will be greatest during the installation phase of the Marine Scheme. Decommissioning is assumed to have similar (or lesser) impacts than installation.

16.4.4.1 Physical Environment

The potential physical environment pathway interactions between the Marine Scheme and other projects have been identified in Table 16-6. From this, one project has the potential for a direct or indirect interaction with the Marine Scheme, which is Havhingsten Segment 2.1 South.

Table 16-6: Matrix to identify potential physical environment impact pathway interactions included in the cumulative effects appraisal

Project Name	Potential Impact Pathways that could interact with Marine Scheme			
	Temporary seabed disturbance	**Localised permanent seabed disturbance due to displacement and removal of debris and boulders**	**Increase in suspended sediment concentrations**	**Water contamination**
Scotland England Green Link/ Eastern Link 1 Onshore Components (Scotland)	***Excluded*** No project activities in marine environment due to HDD at landfall.			
Scotland England Green Link/ Eastern Link 1 Onshore Components (England)	***Excluded*** No project activities in marine environment due to HDD at landfall.			
Berwick Bank Offshore Wind Farm (Export cable)	***Excluded*** No spatial interaction between the two projects	***Excluded*** No spatial interaction between the two projects	***Excluded*** The minimum separation between the two developments is much greater than the predicted 1.4 km maximum distance (Table 16-1:) that fine sand may be transported.	***Excluded*** No spatial interaction between the two projects
Blyth Offshore Demonstrator Array 4 (Phase 2)	***Excluded*** No possible pathway. As indicated by the shape of the tidal excursion ellipses, currents at this location typically flow parallel to the coastline towards the south and north on the flood and ebb tides, respectively. Any sediment plumes in the lower water column resulting from disturbance of the seabed during cable burial will travel in the same direction as the currents and will not therefore interact with the Blyth Demonstration Array. There is therefore no direct flow pathway linking physical processes within the boundary of the array to conditions along the marine installation corridor.			
Havhingsten Segment 2.1 South	***Included*** The use of concrete mattresses or protection will be required where the Marine Scheme cable and Havhingsten Segment 2.1 South cable cross.	***Included*** Preparation of the seabed will be required where the Marine Scheme cable and Havhingsten Segment 2.1 South cable cross.	***Included*** Possible interaction with the Marine Scheme, depending upon programme	
Dunbar East Beach Sea Defence	***Excluded*** No spatial interaction between the two projects	***Excluded*** No spatial interaction between the two projects	***Excluded*** There may be a slight elevation in SSC if the installation phases of Dunbar East Beach Sea Defence and the Marine Scheme were concurrent. SSC would, however, be significantly less than 1 mg/l and therefore impossible to	***Excluded*** No spatial interaction between the two projects

Project Name	Potential Impact Pathways that could interact with Marine Scheme			
	Temporary seabed disturbance	Localised permanent seabed disturbance due to displacement and removal of debris and boulders	Increase in suspended sediment concentrations	Water contamination
			distinguish from background levels.	

Havhingsten Segment 2.1 South

The Havhingsten Segment 2.1 South cable crosses the marine installation corridor between KP 141 and KP 142, approximately 20 km off the coast. Within the North Sea segments, the Havingsten Segment 2.1 North submarine cable was installed using a jet assisted burial plough, and it is assumed that Havhingsten Segment 2.1 South will be installed in the same way. A similar technique has been proposed as one of the options for the burial of the cable for the Marine Scheme. A similar design burial depth of approximately 1.5 m is therefore likely to be achieved. Information about the programme of Havhingsten Segment 2.1 South could not be found during desktop research. As such, the installation of the second cable between KP 141 and KP 142, whether it is the Marine Scheme or Havhingsten Segment 2.1 South, will require suitable protection provided in the form of rock placement or concrete mattresses. It is highly unlikely the installation of the cables between KP 141 and KP 142 would occur at the same time. Therefore, the effects of elevation in SSC are unlikely to occur concurrently and so there would be no cumulative effect.

16.4.4.2 Benthic Ecology

The potential benthic impact pathway interactions between the Marine Scheme and other projects have been identified in Table 16-7. From this, two projects have the potential for a direct or indirect interaction with the Marine Scheme: Berwick Bank Windfarm and Havhingsten Segment 2.1 South. However a crossing of the Havhingsten Segment 2.1 South project has already been considered in Chapter 8: Benthic Ecology and will not be repeated here.

Table 16-7: Matrix to identify potential benthic impact pathway interactions included in the cumulative effects appraisal

Project Name	Potential Impact Pathways that could interact with Marine Scheme					
	Temporary physical disturbance to benthic habitats and species	Permanent loss of benthic habitats and species	Increased SSC in subtidal habitats	Changes to water quality	EMF emissions	Thermal emissions
Scotland England Green Link/ Eastern Link 1 Onshore Components (Scotland)	***Excluded*** No project activities in marine environment due to HDD at landfall.				***Excluded*** No likely pathway identified for EMF and thermal emissions.	
Scotland England Green Link/ Eastern Link 1 Onshore Components (England)	***Excluded*** No project activities in marine environment due to HDD at landfall.				***Excluded*** No likely pathway identified for EMF and thermal emissions.	
Berwick Bank Offshore Wind Farm (Export cable)	***Excluded*** Temporary habitat disturbance has been appraised as resulting in Negligible / Minor effects in Chapter 8: Benthic Ecology. A review of cable installation activities in similar habitats found that habitats that comprised mostly of sediments, such as subtidal sands and gravels, typically recovered swiftly after disturbance, rapidly returning to pre-construction baselines and those of adjacent unimpacted areas (RPS, 2019).	***Excluded*** Possible interaction of the Marine Scheme with the Berwick Bank offshore Wind Farm (export cable) has been considered in Chapter 8: Benthic Ecology.			***Excluded*** No likely pathway identified for EMF and thermal emissions. EMF and thermal ZoIs are local in scale and the potential for cumulative effects at the distance of this project from the marine installation corridor is negligible.	
Blyth Offshore Demonstrator Array 4 (Phase 2)	***Excluded*** Temporary habitat disturbance has been appraised as resulting in Negligible / Minor effects in Chapter 8: Benthic Ecology. A review of cable installation activities in similar habitats found that habitats that comprised mostly of	***Excluded*** Seabed disturbance and SSC ZoI, estimated maximum 1.4 km, will not interact with Marine Scheme.			***Excluded*** No EMF or thermal pathway for turbines or cables. EMF and thermal ZoIs are local in scale and the potential for cumulative effects at the distance of this project from the marine installation corridor is negligible. Also, the cabling associated with this project is inshore of the offshore wind farm.	

Project Name	Potential Impact Pathways that could interact with Marine Scheme					
	Temporary physical disturbance to benthic habitats and species	**Permanent loss of benthic habitats and species**	**Increased SSC in subtidal habitats**	**Changes to water quality**	**EMF emissions**	**Thermal emissions**
	sediments, such as subtidal sands and gravels, typically recovered swiftly after disturbance, rapidly returning to pre-construction baselines and those of adjacent unimpacted areas (RPS, 2019).					
Havhingsten Segment 2.1 South	***Excluded*** Havhingsten Segment 2.1 South has been considered in Chapter 8: Benthic Ecology.					***Excluded*** No thermal effects from telecommunications cables.
Dunbar East Beach Sea Defence	***Excluded*** Temporary habitat disturbance has been appraised as resulting in Negligible / Minor effects in Chapter 8: Benthic Ecology. A review of cable installation activities in similar habitats found that habitats that comprised mostly of sediments, such as subtidal sands and gravels, typically recovered swiftly after disturbance, rapidly returning to pre-construction baselines and those of adjacent unimpacted areas (RPS, 2019).	***Excluded*** The footprint of the Dunbar East Beach Sea Defence is solely within the intertidal area, an area of intertidal rock. No species or habitats of conservation importance were identified within the footprint of the Dunbar East Beach Sea Defence. Given the recent removal of sand from the area, it is anticipated that any benthic communities within the intertidal will be opportunistic or pioneer marine species of low conservation value (Royal HaskoningDHV, 2018).	***Excluded*** Seabed disturbance and SSC ZoI, estimated maximum 1.4 km, will not interact with Marine Scheme.		***Excluded*** No likely pathway identified for EMF and thermal emissions	

16.4.4.3 Fish and Shellfish Ecology

The potential fish and shellfish impact pathway interactions between the Marine Scheme and other projects are shown in Table 16-8. One project has the potential for direct or indirect interaction with the Marine Scheme: the Havhingsten Segment 2.1 South, however a crossing of this project has already been considered in Chapter 9: Fish and Shellfish Ecology and will not be repeated here.

Table 16-8: Matrix to identify potential fish and shellfish impact pathway interactions included in the cumulative effects appraisal

Project Name	Potential Impact Pathways that could interact with Marine Scheme						
	Temporary physical disturbance of habitat	Permanent loss of benthic habitats and species	Temporary increase in SSC	Changes to water quality	EMF emissions	Thermal emissions	Underwater sound
Scotland England Green Link/ Eastern Link 1 Onshore Components (Scotland)	***Excluded*** No project activities in marine environment due to HDD at landfall.				***Excluded*** No likely pathway identified for EMF and thermal emissions.		***Excluded*** No likely pathway identified for underwater sound.
Scotland England Green Link/ Eastern Link 1 Onshore Components (England)	***Excluded*** No project activities in marine environment due to HDD at landfall.				***Excluded*** No likely pathway identified for EMF and thermal emissions.		***Excluded*** No likely pathway identified for underwater sound.
Berwick Bank Offshore Wind Farm (Export cable)	***Excluded*** Temporary habitat disturbance has been appraised as resulting in Negligible / Minor effects in Chapter 9: Fish and Shellfish Ecology. A review of cable installation activities in similar habitats found that habitats that comprised mostly of sediments, such as subtidal sands and gravels, typically recovered swiftly after disturbance, rapidly returning to pre-construction baselines and those of adjacent unimpacted areas (RPS, 2019).	***Excluded*** Seabed disturbance and SSC ZoI, estimated maximum 2.8 km, will not interact with Marine Scheme.			***Excluded*** No likely pathway identified for EMF and thermal emissions. EMF and thermal ZoIs are local in scale and the potential for cumulative effects at the distance of this project from the marine installation corridor is negligible.		***Excluded*** No likely pathway identified for underwater sound.
Blyth Offshore Demonstrator Array 4 (Phase 2)	***Excluded*** Seabed disturbance and SSC ZOI, estimated maximum 1.4 km, will not interact with Marine Scheme.				***Excluded*** No EMF or thermal pathway for turbines.		***Excluded*** The ES for Blyth Offshore Demonstrator Array 4 (Phase 2) did

Project Name	Potential Impact Pathways that could interact with Marine Scheme						
	Temporary physical disturbance of habitat	Permanent loss of benthic habitats and species	Temporary increase in SSC	Changes to water quality	EMF emissions	Thermal emissions	Underwater sound
							not consider operational noise effects. Assuming this topic was scoped out it suggests that there was considered to be no potential for significant cumulative effects. As such there is no potential for the Marine Scheme construction noise to have a cumulative effect with operational noise from Blyth Offshore Demonstrator Array 4 (Phase 2).
Havhingsten Segment 2.1 South	***Excluded*** Havhingsten Segment 2.1 South has already been considered in Chapter 9: Fish and Shellfish Ecology.						
Dunbar East Beach Sea Defence	***Excluded*** Dunbar project ZOIs will not interact with Marine Scheme.				***Excluded*** No likely pathway identified for EMF and thermal emissions		***Excluded*** No likely pathway identified for underwater sound.

16.4.4.4 Marine Mammals

The potential marine mammal impact pathway interactions between the Marine Scheme and other projects are set out in Table 16-9. From this, one project has the potential for a direct or indirect interaction with the Marine Scheme: Berwick Bank Offshore Wind Farm (Export Cable).

Table 16-9: Matrix to identify potential marine mammals impact pathway interactions included in the cumulative effects appraisal

<table>
<tr><th rowspan="2">Project Name</th><th colspan="4">Potential Impact Pathways that could interact with Marine Scheme</th></tr>
<tr><th>Underwater sound</th><th>Vessel movement</th><th>EMF emissions</th><th>Thermal emissions</th></tr>
<tr><td>Scotland England Green Link/ Eastern Link 1 Onshore Components (Scotland)</td><td rowspan="2">Excluded
No likely pathway identified for underwater sound</td><td rowspan="2">Excluded
No likely pathway identified for vessel movement</td><td colspan="2" rowspan="2">Excluded
No likely pathway identified for EMF and thermal emissions.</td></tr>
<tr><td>Scotland England Green Link/ Eastern Link 1 Onshore Components (England)</td></tr>
<tr><td>Berwick Bank Offshore Wind Farm (Export cable)</td><td colspan="2">Included
Possible interaction with Marine Scheme</td><td colspan="2">Excluded
No likely pathway identified for EMF and thermal emissions.</td></tr>
<tr><td>Blyth Offshore Demonstrator Array 4 (Phase 2)</td><td colspan="2">Excluded
The Blyth Offshore Demonstrator Array 4 (Phase 2) is a floating wind farm and will not have any fixed foundation turbines. The floating platforms and turbines will be built at the quayside and towed to site and will not rely on many vessels or specialised vessels. Therefore, the installation of this wind farm will not involve piling which generates underwater sound.</td><td>Excluded
No EMF pathway for turbines</td><td>Excluded
No thermal pathway for turbines</td></tr>
<tr><td>Havhingsten Segment 2.1 South</td><td colspan="2">Excluded
Underwater sound for the installation of this telecommunications cable is likely to be restricted to vessel movement. Underwater sound associated with vessel movement was scoped out of the marine mammal appraisal in Chapter 10.</td><td>Excluded
EMF emission from telecommunications cables are typically lower than for HVDC.</td><td>Excluded
No thermal effects from telecommunications cables</td></tr>
<tr><td>Dunbar East Beach Sea Defence</td><td>Excluded
No likely pathway identified for underwater noise</td><td>Excluded
No likely pathway identified for vessel movement</td><td colspan="2">Excluded
No likely pathway identified for EMF and thermal emissions.</td></tr>
</table>

Berwick Bank Offshore Wind Farm Export Cable

The landfall location for the export cable for this project is approximately 2.5 km north-west of the Marine Scheme. There is potential for cumulative effects of two impact pathways in relation to activities effecting underwater sound.

If cable installation activities occur simultaneously, cumulative effects of underwater sound resulting from the installation vessels for the export cable and the Marine Scheme could occur concurrently. However, as installation vessels for either project would only be at any particular location for short periods of time and taking into account that the noise levels would be similar to background levels there was found to be no potential for impacts to marine mammals from the Marine Scheme vessel and cable lay sound. Thus, the potential cumulative effect is considered to be **negligible** and therefore **not significant**.

Similarly, there will be a small number of vessels involved in the installation phase which are unlikely to significantly increase the risk of collision with marine mammals when considered against background shipping levels. Thus, the cumulative effect of these highly localised effects is considered to be **negligible** and therefore **not significant.**

16.4.4.5 Ornithology

The potential ornithology impact pathway interactions between the Marine Scheme and other projects have been set out in Table 16-10. From this, five projects are considered to have some potential for a direct or indirect interaction with the Marine Scheme; these are Scotland England Green Link/ Eastern Link 1 Onshore Components (Scotland), Scotland England Green Link/ Eastern Link 1 Onshore Components (England), Berwick Bank Offshore Wind Farm (Export Cable), Blyth Offshore Demonstrator Array 4 (Phase 2) and Havhingsten Segment 2.1 South.

Table 16-10: Matrix to identify potential ornithological impact pathway interactions included in the cumulative effects appraisal

<table>
<tr><th rowspan="2">Project Name</th><th colspan="3">Potential Impact Pathways that could interact with Marine Scheme</th></tr>
<tr><th>Temporary disturbance and displacement from installation activities associated with sound, visual impacts, and presence from vessel and construction activity</th><th>Disturbance to seabed resulting in changes in prey availability</th><th>Alteration of water quality due to increased SSC, unplanned releases, accidental leaks, and spills from vessels and plant</th></tr>
<tr><td>Scotland England Green Link/ Eastern Link 1 Onshore Components (Scotland)</td><td>Included
Potential for interaction due to proximity of Outer Firth of Forth & St Andrews Bay Complex Special Protected Area (SPA).</td><td colspan="2" rowspan="3">Excluded
No interaction due to use of HDD at both landfalls. Any effects are therefore limited to the Marine Scheme alone.

No significant effects have been predicted for alteration of water quality through the unplanned release of pollutants. Stringent control measures make it extremely unlikely that projects would individually have a spill of contaminants at the scale that would lead to a potential cumulative significant effect.</td></tr>
<tr><td>Scotland England Green Link/ Eastern Link 1 Onshore Components (England)</td><td>Included
Potential for interaction but to a much lesser extent than at the Scottish landfall.</td></tr>
<tr><td>Berwick Bank Offshore Wind Farm (Export cable)</td><td>Included
Potential for interaction due to proximity of Outer Firth of Forth & St Andrews Bay Complex SPA.</td></tr>
<tr><td>Blyth Offshore Demonstrator Array 4 (Phase 2)</td><td>Included
Potential for interaction, potential for displaced .or disturbed birds from the Marine Scheme to collide with the wind turbines.</td><td>Excluded
Any effects on prey are predicted to be localised in nature. Therefore, no effects are anticipated at this distance.</td><td>Excluded
No possible pathway (see Table 16-5).</td></tr>
<tr><td>Havhingsten Segment 2.1 South</td><td>Included
Potential for interaction due to physical disturbance of seabed during cable installation activities..</td><td colspan="2">Included
Possible interaction with the Marine Scheme, depending upon programme</td></tr>
<tr><td>Dunbar East Beach Sea Defence</td><td colspan="3">Excluded
No effects are anticipated at this distance.</td></tr>
</table>

Scotland England Green Link/ Eastern Link 1 Onshore Components (Scotland), Scotland England Green Link/ Eastern Link 1 Onshore Components (England), and Berwick Bank Offshore Wind Farm (Export cable)

Cumulative temporary disturbance and displacement from installation activities is possible for cable installation projects, especially if installation is occurring at the same location at the same time. The

marine installation corridor passes through the Outer Firth of Forth & St Andrews Bay Complex SPA as it leaves the Scottish landfall, which coincides with the Scottish Onshore Scheme and the Berwick Bank Offshore Wind Farm Export cable. At the English landfall, the marine installation corridor lies close to the Northumbria Coast SPA / Ramsar site. At both the Scottish and English landfalls, use of HDD cable installation will mean that works will occur underground which will limit effects upon sea birds. The breakout points will be a sufficient distance (between four and 10 metres below lowest astronomical tide (LAT and up to 1500m away) from the Scottish Onshore Scheme that impacts of noise will not coincide with the onshore works. Vessel works are also expected to commence after completion of HDD in most instances. Where the marine installation corridor passes through the Outer Firth of Forth & St Andrews Bay Complex Special Protection Area (SPA) as it leaves the Scottish landfall and the Northumberland Marine SPA, a commitment will be included with the CEMP to ensure that transiting vessels move at low speeds allowing any rafts of birds to disperse naturally well in advance of an approaching vessel. Because of this, there will be no cumulative effects upon birds attributed to these projects.

Any effects on prey are predicted to be localised in nature and the effects of the Marine Scheme alone were considered to be **negligible**, which is **not significant**. Neither the Scotland England Green Link / Eastern Link 1 Onshore Components (Scotland) nor the Scotland England Green Link/ Eastern Link 1 Onshore Components (England) is anticipated to have any construction disturbance effects on prey species and cumulative effects are therefore no possible. It is anticipated that the Berwick Bank Offshore Wind Farm (Export cable) is likely to has an equally insignificant impact on prey items as the Marine Scheme. Therefore, there is no cumulative effect predicted between the Marine Scheme and any of these other projects.

Blyth Offshore Demonstrator Array 4 (Phase 2)

If any of the seabird species were to be disturbed and displaced due to the Marine Scheme, they could come into contact with the construction or operation of Blyth Offshore Demonstrator, or vice versa. If this were to occur there could be cumulative effects such as further displacement of birds or disturbed birds colliding with the wind turbines. However, the effects of the Marine Scheme on even the most sensitive species (shag) were considered to be minor to negligible, given the localised and temporary nature of the cable laying works. As such it is considered that the likelihood of significant cumulative effects occurring is **negligible** which is **not significant**.

Havhingsten Segment 2.1 South

The Marine Scheme will require a crossing agreement with Havhingsten Segment 2.1 South and, dependent on both project's programme, it is likely that installation activities may have temporal and spatial interactions. Physical disturbance of the seabed during the route preparation and cable installation activities of both projects occurring concurrently will temporarily increase SSC (i.e., turbidity) and may subsequently result in sediment deposition and smothering of prey species. In Section 16.4.4.1, the cumulative effect upon water quality due to an increase in SSC was measured as minor.

In addition, cable installation will disturb a small proportion of the total prey species in the area and the loss of prey will result in a low level of change for a short period of time. Although, seabirds associated with internationally important sites are likely to be present within the marine installation corridor, the loss of prey will account for only a small area of the available marine habitats and therefore bird species are unlikely to be sensitive to it and will have high recoverability. In Section 16.4.4.3, the cumulative effect upon fish and shellfish due to smothering and displacement from underwater sound was **negligible** for both, and therefore **not significant**.

With vessels associated with both projects located in proximity to one another, there is a risk of unplanned release of pollutants occurring at the same time. Any release has the potential to significantly alter water quality which in turn may affect any present waterbirds and/ or seabirds in the area. All efforts to avoid/ minimise effects to water quality will be taken, including adherence to relevant guidance (e.g., Pollution Prevention Guidance). A Construction Environmental Management Plan (CEMP), Emergency Spill Response Plan and Waste Management Plan will be implemented during the installation phase of the project to minimise releases. Health, Safety, and Environment (HSE) procedures will also be implemented, with strict weather and personnel limits to reduce any risk of accidental spillage. Given that much of this is covered by regulations that will apply equally to the construction of the Havhingsten

Segment 2.1 South project, it can be concluded that cumulative effects would also be **Negligible**, which is not significant. Furthermore, preparedness and swift response is essential for effective spill management and as such, response plans will be in place should an incident occur. When considering the control measures outlined above, the likelihood of occurrence for accidental release/ spillage is low. Therefore, the expected impact to seabirds from altered water quality resulting from pollution events is low, with the magnitude and significance of this effect is deemed **negligible,** and therefore **not significant**.

16.4.4.6 Marine Archaeology

The potential marine archaeology impact pathway interactions between the Marine Scheme and other projects have been identified in Table 16-11. Given the highly localised nature of direct impacts on marine archaeological receptors, one project is considered to have the potential for direct or indirect interaction with the Marine Scheme: Havhingsten Segment 2.1 South.

Table 16-11: Matrix to identify potential marine archaeology impact pathway interactions included in the cumulative effects appraisal

Project Name	Potential Impact Pathways that could interact with Marine Scheme		
	Direct disturbance to the seabed causing damage	Direct damage due to use of anchors by vessels	Indirect changes to hydrodynamic and sediment transport regimes
Scotland England Green Link/ Eastern Link 1 Onshore Components (Scotland)	***Excluded*** Marine archaeology will not be affected by onshore works due to HDD use at the landfall.		
Scotland England Green Link/ Eastern Link 1 Onshore Components (England)	***Excluded*** Marine archaeology will not be affected by onshore works due to HDD use at the landfall.		
Berwick Bank Offshore Wind Farm (Export cable)	***Excluded*** Project is not located within the marine installation corridor and therefore will not be affected by direct disturbance or damage.		***Excluded*** Indirect effects of burial are likely to be beneficial to marine archaeology.
Blyth Offshore Demonstrator Array 4 (Phase 2)	***Excluded*** No effects are anticipated at this distance.		
Havhingsten Segment 2.1 South	***Included*** Seabed disturbance will occur within marine installation corridor.		***Excluded*** Indirect effects of burial are likely to be beneficial to marine archaeology marine installation corridor.
Dunbar East Beach Sea Defence	***Excluded*** No effects are anticipated at this distance.		

Havhingsten Segment 2.1 South

Direct and indirect physical impacts on marine archaeology will in most cases be limited by the location and extent of sensitive receptors.

The potential for indirect impacts increases as the distance between sites decreases, and therefore there is high potential relating to Havhingsten Segment 2.1 South as it crosses the marine installation corridor between KP 137 and KP 138. There is the potential for indirect impacts to occur upon known and potential marine archaeology as a result of changes to hydrodynamic and sediment transport regimes.

For cable and pipeline projects, any known seabed features should have been avoided during the route development process, as these would constitute engineering hazards. As part of the marine licence consent conditions, a Written Scheme of Investigation (WSI) is required for those cable projects which

are under construction or operational. As part of the WSI, a Protocol for Archaeological Discoveries (PAD) would be adopted to mitigate against any new discoveries. This will likely be the same for Havhingsten Segment 2.1 South, which is currently in progress of applying for a marine licence.

Impacts to buried material in general is likely to be relatively minimal, although over a long distance. The cables would likely have been shallowly buried, or any covering material would have a relatively small footprint. Furthermore, as cables and pipelines are likely to be buried or covered by low-lying material, they are unlikely to cause noticeable changes to hydrodynamic and sediment transport regimes. As appraised in Chapter 7: Physical Environment, indirect impacts, such as scour, are very localised.

Due to the proposed embedded mitigation detailed in Chapter 12: Marine Archaeology, Section 12.7 such as the implementation of Archaeological Exclusion Zones (AEZs), reporting protocols and other best-practice elements, most effects will be avoided, particularly to known receptors identified on, in or beneath the seabed. Therefore, any cumulative impacts from direct and indirect impacts of cables would be **negligible** which is **not significant**.

16.4.4.7 Shipping and Navigation

The potential shipping and navigation impact pathway interactions between the Marine Scheme and other projects have been identified in Table 16-12. The other developments likely to have potential for cumulative effects are: Berwick Bank Offshore Wind Farm (Export Cable), Blyth Offshore Demonstrator Array 4 (Phase 2), and Havhingsten Segment 2.1 South. As the activities associated with installing infrastructure associated with these projects and the Marine Scheme will be similar, they have been assessed together.

Table 16-12: Matrix to identify potential shipping and navigation impact pathway interactions included in the cumulative effects appraisal

Project Name	Potential Impact Pathways that could interact with Marine Scheme					
	Vessel-to-vessel collision	Deviation from established and identified vessel routes and areas	Interaction with vessel anchors and anchoring activity	Interaction with fishing gear	Reduction in under keel clearance	EMF results in magnetic compass deviation
Scotland England Green Link/ Eastern Link 1 Onshore Components (Scotland)	***Excluded*** No potential for vessels associated with Marine Scheme to be working concurrently with HDD.			***Excluded*** No likely pathways identified.		
Scotland England Green Link/ Eastern Link 1 Onshore Components (England)	***Excluded*** No potential for vessels associated with Marine Scheme to be working concurrently with HDD.			***Excluded*** No likely pathways identified.		
Berwick Bank Offshore Wind Farm (Export cable)	***Included*** Risk identified due to proximity		***Excluded*** No likely pathways identified.			
Blyth Offshore Demonstrator Array 4 (Phase 2)	***Included*** Risk identified due to proximity		***Excluded*** No likely pathways identified.			
Havhingsten Segment 2.1 South	***Included*** Risk identified due to proximity		***Excluded*** No likely pathways identified.			
Dunbar East Beach Sea Defence	***Excluded*** No offshore works will be required for the project. All works will be undertaken using land based plant and so works will be undertaken when tides allow access.					

Berwick Bank Offshore Wind Farm (Export cable), Blyth Offshore Demonstrator Array 4 (Phase 2), and Havhingsten Segment 2.1 South

If construction activities overlap with construction activities associated with any of these three projects, a temporary increase in vessel-to-vessel collision and vessel deviations is considered possible, particularly at or near the landfalls.

Any potential risk will be mitigated through consultation with the relevant project developers to confirm construction and operation dates and otherwise rationalise activity schedules. Irrespective, it is not envisaged that the concurrent activities of these shortlisted projects and the Marine Scheme will affect the risk categorisation presented in Chapter 13: Shipping and Navigation. Taking this into account no significant cumulative effects are anticipated.

16.4.4.8 Commercial Fisheries

The potential commercial fisheries impact pathway interactions between the Marine Scheme and other projects have been set out in Table 16-13. The other developments likely to have potential for cumulative effects are: Berwick Bank Offshore Wind Farm (Export Cable), Blyth Offshore Demonstrator Array 4 (Phase 2), Havhingsten Segment 2.1 South, SG1A Transmission Asset (for Seagreen 1 Offshore Windfarm), Neart Na Gaoithe Offshore Wind, Inch Cape Offshore Wind Farm and Havhingsten Segment 2.1 North.

Table 16-13: Matrix to identify potential commercial fisheries impact pathway interactions included in the cumulative effects appraisal

Project Name	Potential Impact Pathways that could interact with Marine Scheme				
	Loss or restricted access to fishing grounds	Displacement of fishing activity into other areas	Interference with fishing activities	Snagging risk – loss or damage to fishing gear	Impacts on fishing as a result of impacts on commercial species
Scotland England Green Link/ Eastern Link 1 Onshore Components (Scotland)	***Excluded*** No offshore works will occur for the Project Onshore Scheme. No project activities in marine environment due to HDD at landfall.				
Scotland England Green Link/ Eastern Link 1 Onshore Components (England)	***Excluded*** No offshore works will occur for the Project Onshore Scheme. No project activities in marine environment due to HDD at landfall.				
Berwick Bank Offshore Wind Farm (Export cable)	***Included*** Spatial interaction between the two projects				
Blyth Offshore Demonstrator Array 4 (Phase 2)	***Included*** Spatial interaction between the two projects				
Havhingsten Segment 2.1 South	***Included*** Spatial interaction between the two projects				
Dunbar East Beach Sea Defence	***Excluded*** No offshore works will be required for the project				
SG1A Transmission Asset (for Seagreen 1 Offshore Windfarm)	***Included*** Spatial interaction between the two projects				
Neart Na Gaoithe Offshore Wind	***Included*** Spatial interaction between the two projects				
Inch Cape Offshore Wind Farm	***Included*** Spatial interaction between the two projects				

Project Name	Potential Impact Pathways that could interact with Marine Scheme				
	Loss or restricted access to fishing grounds	Displacement of fishing activity into other areas	Interference with fishing activities	Snagging risk – loss or damage to fishing gear	Impacts on fishing as a result of impacts on commercial species
Havhingsten Segment 2.1 North	***Included*** Spatial interaction between the two projects				

Berwick Bank Offshore Wind Farm (Export cable), Blyth Offshore Demonstrator Array 4 (Phase 2), Havhingsten Segment 2.1 South, SG1A Transmission Asset (for Seagreen 1 Offshore Windfarm), Neart Na Gaoithe Offshore Wind, Inch Cape Offshore Wind Farm and Havhingsten Segment 2.1 North

Berwick Bank Offshore Wind Farm (Export cable) is expected to begin construction in 2025 which would coincide with the installation phase of the Marine Scheme. Blyth Offshore Demonstrator Array 4 (Phase 2), SG1A Transmission Asset (for Seagreen 1 Offshore Windfarm, Neart Na Gaoithe Offshore Wind, Inch Cape Offshore Wind Farm and Havhingsten Segment 2.1 North are all expected to be operational by the Marine Scheme installation phase (2025).

In the case of the Blyth Offshore Demonstrator Array 4, given its inshore location, vessels potentially affected are expected to be for the most part potters / creelers (EDF, 2020). In the case of Berwick Bank, activity is expected to be predominantly by local Scottish creelers and demersal trawlers, particularly in areas of relevance to its export cable corridor. Although at lower levels, the location of the Berwick Bank array also supports creeling by local Scottish vessels as well as some scallop dredging activity. Activity in areas where the Marine Scheme overlaps with Havhingsten Segment 2.1 (South and North) projects, may include both potting / creeling and demersal trawling.

In the case of Seagreen 1A (which involves installation of a cable to connect Project Alpha and Project Bravo windfarms) the predominant fishing activity within the boundaries of Project Alpha and Project Bravo is scallop dredging. Trawling for squid and creeling for lobster and crabs also occurs in the immediate area of the sites however to a much lesser extent (SSE Renewables Energy, 2018). The wider area around Project Alpha and Project Bravo also supports Nephrops and whitefish fisheries (Seagreen Wind Energy, 2018). In the case of Inch Cape Offshore Wind Farm, the predominant fishing activity were predominantly made up of Nephrops and lobster (Inch Cape Offshore Limited, 2018).

Any temporary loss of fishing grounds and associated displacement resulting from construction works associated with these projects would be localised and short to medium term, being limited to areas where safety zones / advisory safety zones may be in place at a given time. Similarly, potential interference to fishing activities and increased snagging risk would also be expected to be short to medium term and localised, being predominantly related to vessel transit routes and areas around sections of cables awaiting burial or protection. In all cases, these projects would be expected to implement similar good practice embedded mitigation measures to those proposed by the Marine Scheme alone, such as a Fisheries Liaison and Co-existence Plan and Fisheries Management and Mitigation Strategy. Cumulative effects during the installation phase are therefore considered to not exceed those identified for the Marine Scheme alone (**minor** and therefore **not significant**).

During the operational phase of the Marine Scheme, there would be potential for all the projects listed above to result in additional long-term loss of fishing grounds and associated displacement as well as increased snagging risk. Loss of grounds and associated displacement and increased snagging risk associated with cable projects would, for the most part, be limited to discrete areas where cable protection may be required. Although limited, temporary advisory safety zones that may be in place at a given time around repair works or vulnerable sections of cables, which may also contribute to the overall cumulative effects.

In the case of the Neart Na Gaoithe Offshore Wind Farm and Inch Cape Offshore Wind Farm, loss of grounds and associated displacement and increased snagging risk would arise from the presence of project infrastructure (i.e., foundations, scour protection, cable protection) as well as temporary safety zones and advisory safety zones that may be required at times during the operational phase. In the

case of the Blyth Offshore Demonstrator Array 4 (Phase 2), this involves floating platforms and turbines and so there would be no loss of grounds, associated displacement or increased snagging risk.

Potential impacts would be long term, however, in all cases, the areas affected will be very localised. In addition, embedded mitigation measures relating to maintenance or repair works, similar to those proposed by the Marine Scheme, would be expected to be implemented by the other projects considered in the appraisal. Cumulative effects during the operational phase are therefore considered to not exceed those identified for the Marine Scheme (**minor** and therefore **not significant).**

Regarding the decommissioning phase, as described previously in the appraisal of the Marine Scheme alone, it is considered that effects will be equivalent to or lower than the effects associated with installation. As such, the impacts identified in the cumulative appraisal undertaken in respect of the installation phase are considered to also apply to decommissioning activities.

There may also be potential for other projects to have a cumulative effect with the Marine Scheme on fish and shellfish species, which could in turn indirectly affect the productivity of the commercial fisheries that depend upon them.

A cumulative appraisal of the impact on fish and shellfish ecology during the installation, operational and decommissioning phase of the Marine Scheme cumulatively with other plans and projects is provided in Section 16.4.4.3. This cumulative appraisal did not identify any cumulative impacts above minor significance on fish and shellfish species. Consequently, any impacts associated with this on the commercial fisheries that target them are also expected to not exceed **minor** significance and are therefore **not significant**.

16.4.4.9 Other Sea Users

The potential other sea users impact pathway interactions between the Marine Scheme and other projects are set out in Table 16-14. The other development likely to have potential for cumulative effects are Berwick Bank Offshore Wind Farm (Export cable).

Table 16-14: Matrix to identify potential other sea users impact pathway interactions included in the scoped into cumulative effects appraisal

<table>
<tr><th rowspan="2">Project Name</th><th colspan="3">Potential Impact Pathways that could interact with Marine Scheme</th></tr>
<tr><th>Disturbance to marine recreational users (up to MHWS)</th><th>Disruption to vessel routeing and access to other sea users working area</th><th>Risk of damage to or interference with a third-party cable or pipeline asset</th></tr>
<tr><td>Scotland England Green Link/ Eastern Link 1 Onshore Components (Scotland)</td><td colspan="3">Excluded
No interaction anticipated.</td></tr>
<tr><td>Scotland England Green Link/ Eastern Link 1 Onshore Components (England)</td><td colspan="3">Excluded
No interaction anticipated</td></tr>
<tr><td>Berwick Bank Offshore Wind Farm (Export cable)</td><td>Included
Interaction along the coastline identified due to proximity.</td><td rowspan="3">Excluded
All effects of the Marine Scheme alone were reported as Negligible and it is not therefore possible for there to be significant cumulative effects.</td><td rowspan="3">Excluded
No cumulative effects anticipated on third party infrastructure</td></tr>
<tr><td>Blyth Offshore Demonstrator Array 4 (Phase 2)</td><td rowspan="3">Excluded
Considered to be a sufficient distance from the Marine Scheme for there to be no cumulative effects.</td></tr>
<tr><td>Havhingsten Segment 2.1 South</td></tr>
<tr><td>Dunbar East Beach Sea Defence</td><td colspan="2">Excluded
No interaction expected.</td></tr>
</table>

Berwick Bank Offshore Wind Farm (Export cable)

Berwick Bank Offshore Wind Farm export cable is expected to start construction in 2024 so there is potential for overlap with the Marine Scheme installation phase. The landfall for the Berwick Bank Offshore Wind Farm export cable is at Skateraw, approximately 2.5 km north-west of the marine installation corridor. Due to this proximity, it is possible that marine recreational users that travel through the marine installation corridor may also navigate through Berwick Bank's construction area. Therefore, should construction of both projects be undertaken concurrently marine recreational users could be displaced from the area.

It is assumed that beaches will remain open to the public for shore-based recreational use (i.e. swimmers, surfers, wind and kite surfers, paddle boarders, canoers and kayakers, and shoreline anglers) meaning that cumulative effects could potentially affect sailors, scuba divers, and sea anglers.

Notice(s) will be given to marine recreational users in the area via Local Councils, Notices to Mariners, Kingfisher Bulletins, NAVTEX, and NAVAREA warnings. Particular attention will be paid to ensuring the following organisations receive the notifications: Royal Yachting Association (RYA), Maritime and Coastguard Agency (MCA) and local sailing clubs (i.e. Dunbar Sailing Club).

The cumulative magnitude of impact has been assessed as low as the installation works at the coast temporary and short term (<1 year). Therefore, the cumulative effect is **negligible**, which is **not significant.**

16.4.4.10 Cumulative Effects Appraisal Summary

Table 16-15 presents a summary of cumulative effects detailed in this appraisal.

Table 16-15: Cumulative Effects Appraisal Summary

Marine Scheme Phase	Potential for Interaction	Potential Impact Pathways	Potential for Cumulative Effect	Mitigation	Significance of cumulative effect
Scotland England Green Link/ Eastern Link 1 Onshore Components (Scotland)					
Installation	The cable will be installed from the landfall site to the nearshore via HDD.	Ornithology • Temporary disturbance and displacement from installation activities associated with sound, visual impacts, and presence from vessel and construction activity	• The marine installation corridor passes through Outer Firth of Forth & St Andrews Bay Complex SPA; • Use of HDD cable installation will mean that works will occur under the ground and therefore limit effects upon sea birds; • The breakout points will be a sufficient distance from the Scottish Onshore Scheme that impacts of noise and other sources of disturbance will not coincide with the onshore works; and • Not anticipated to have any construction disturbance effects on prey species	• Use of HDD cable installation; • Consultation with the relevant operators; • Rationalise activity schedules; and • Seabird observer will be utilised	No cumulative effects
Scotland England Green Link/ Eastern Link 1 Onshore Components (England)					
Installation	The cable will be installed from the landfall site to the nearshore via HDD	Ornithology • Temporary disturbance and displacement from installation activities associated with sound, visual impacts, and presence from vessel and construction activity	• The marine installation corridor passes through Outer Firth of Forth & St Andrews Bay Complex SPA; • Use of HDD cable installation will mean that works will occur under the ground and therefore limit effects upon sea birds; • The breakout points will be a sufficient distance from the English Onshore Scheme that impacts of noise and other sources of disturbance will not coincide with the onshore works; and • Not anticipated to have any construction disturbance effects on prey species	• Use of HDD cable installation; • Consultation with the relevant operators; • Rationalise activity schedules; and • Seabird observer will be utilised.	No cumulative effects
Berwick Bank Offshore Wind Farm (Export cable only)					

Marine Scheme Phase	Potential for Interaction	Potential Impact Pathways	Potential for Cumulative Effect	Mitigation	Significance of cumulative effect
Installation	Current information available at the time of writing suggest that Berwick Bank's export cable will be ready for service after 2025, which will coincide with the installation of the Marine Scheme, which is due to begin in 2025.	Marine Mammals • Underwater sound • Vessel movement	• Installation for the project would be at any one location for short periods of time, and noise levels would be similar to that of background levels; and • The small number of vessels involved in the installation and are unlikely to significantly increase the risk of collision in comparison to background shipping levels.	• CEMP; • Consultation with the relevant operators; and • Rationalise activity schedules.	**Negligible** and therefore **not significant**
		Ornithology • Temporary disturbance and displacement from installation activities associated with sound, visual impacts, and presence from vessel and construction activity	• The marine installation corridor passes through Outer Firth of Forth & St Andrews Bay Complex SPA; • Use of HDD cable installation will mean that works will occur under the ground and therefore limit effects upon sea birds; and • Not anticipated to have any construction disturbance effects on prey species	• Use of HDD; • Consultation with the relevant operators; • Rationalise activity schedules; and • Seabird observer will be utilised.	No cumulative effects
		Shipping and Navigation • Vessel-to-vessel collision • Deviation from established and identified vessel routes and areas • Interaction with vessel anchors and anchoring activity • Interaction with fishing gear • Reduction in under keel clearance • EMF results in magnetic compass deviation	• If construction activities overlap a temporary increase in vessel-to-vessel collision and vessel deviations is considered possible, particularly at or near the landfall.	• Consultation with the relevant operators; and • Rationalise activity schedules.	ALARP
		Commercial Fisheries • Loss or restricted access to fishing grounds	• Potential for local Scottish creelers and demersal trawlers to be affected during installation phases; and	• Good practice mitigation measures such as a Fisheries Liaison and Co-existence Plan	**Minor** and therefore **not significant**

Marine Scheme Phase	Potential for Interaction	Potential Impact Pathways	Potential for Cumulative Effect	Mitigation	Significance of cumulative effect
		• Displacement of fishing activity into other areas	• Any temporary loss of fishing grounds and associated displacement as a result of construction works at these projects would be localised and short to medium term.	and Fisheries Management and Mitigation Strategy; and • Where the removal or relocation of static gear may be required during the installation phase, appropriate mitigation will be implemented for affected vessels following an evidence-based approach, in line with FLOWW guidance.	
		Other Users of the Sea • Disturbance to marine recreational users (up to MHWS) • Disruption to vessel routeing and access to other sea users working area	• Should construction of both projects be undertaken in the same time period, marine recreational users will be displaced from the area. It is assumed that beaches will remain open to the public for shore-based recreational use (swimmers, surfers, wind and kite surfers, paddle boarders, canoers and kayakers, and shoreline anglers) meaning that sailors, scuba divers, and sea anglers will be affected.	• Notice(s) to Mariners; and • Safety zone	**Negligible** and therefore **not significant**
Operation	During operation, additional long-term loss of fishing grounds and associated displacement as well as increased snagging risk	Commercial Fisheries • Interference with fishing activities • Snagging risk – loss or damage to fishing gear • Impacts on fishing as a result of impacts on commercial species	• Loss of grounds and associated displacement and increased snagging risk associated with cable projects would be for the most part limited to discrete areas where cable protection may be required and temporary advisory safety zones that may be in place at a given time.	• Advisory safety zones; • Good practice mitigation measures such as a Fisheries Liaison and Co-existence Plan and Fisheries Management and Mitigation Strategy; and • Where the removal or relocation of static gear may be required during the installation phase, appropriate mitigation will be implemented for affected vessels following an evidence-based approach, in line with FLOWW guidance.	**Minor** and therefore **not significant**
Blyth Offshore Demonstrator Array 4 (Phase 2)					

Marine Scheme Phase	Potential for Interaction	Potential Impact Pathways	Potential for Cumulative Effect	Mitigation	Significance of cumulative effect
Installation	Blyth Offshore Demonstrator is located 5 km west of the marine installation corridor, closer to the coastline. The proposed wind farm is targeting to be fully commissioned by 2025, which will coincide with the installation of the marine installation corridor.	Ornithology • Temporary disturbance and displacement from installation activities associated with sound, visual impacts, and presence from vessel and construction activity	• If any of the seabird species were to be disturbed and displaced due to the Marine Scheme, such that they could come into contact with the construction or operation of Blyth Offshore Demonstrator, then further displacement of birds or collision, could occur.	• CEMP; • Consultation with the relevant operators; • Rationalise activity schedules; and • A seabird observer will be utilised to ensure that vessels travel at slow speeds	**Negligible** which is **not significant**
		Shipping and Navigation • Vessel-to-vessel collision • Deviation from established and identified vessel routes and areas • Interaction with vessel anchors and anchoring activity • Interaction with fishing gear • Reduction in under keel clearance • EMF results in magnetic compass deviation	• If construction activities overlap a temporary increase in vessel-to-vessel collision and vessel deviations is considered possible, particularly at or near the landfall.	• Consultation with the relevant operators; and • Rationalise activity schedules.	ALARP
		Commercial Fisheries • Loss or restricted access to fishing grounds • Displacement of fishing activity into other areas	• Potential for potting/ creeling vessels to be affected during installation phases; • Any temporary loss of fishing grounds and associated displacement as a result of construction works at these projects would be localised and short to medium term; and	• Good practice mitigation measures such as a Fisheries Liaison and Co-existence Plan and Fisheries Management and Mitigation Strategy;	**Minor** which is **not significant**

Marine Scheme Phase	Potential for Interaction	Potential Impact Pathways	Potential for Cumulative Effect	Mitigation	Significance of cumulative effect
Operation	Any required repairs occurring at the same time.	Commercial Fisheries • Interference with fishing activities • Snagging risk – loss or damage to fishing gear • Impacts on fishing as a result of impacts on commercial species	• Loss of grounds and associated displacement and increased snagging risk associated with cable projects would be for the most part limited to discrete areas where cable protection may be required and temporary advisory safety zones that may be in place at a given time.	• Advisory safety zones; • Good practice mitigation measures such as a Fisheries Liaison and Co-existence Plan and Fisheries Management and Mitigation Strategy; and • Where the removal or relocation of static gear may be required during the installation phase, appropriate mitigation will be implemented for affected vessels following an evidence-based approach, in line with FLOWW guidance.	**Minor** and therefore **not significant**
Havhingsten Segment 2.1 South					
Installation	Havhingsten Segment 2.1 South will intersect the Marine Scheme between KP 137 and KP 138. There is potential for the two schemes to interact. However, at the time of writing, there is no clear timescale for installation of Havhingsten Segment 2.1 South, which was initially proposed to be completed in 2020.	Physical Environment • Temporary seabed disturbance; • Localized permanent seabed disturbance due to displacement and removal of debris and boulders; • Increase in suspended sediment concentrations; and • Water contamination	• Use of concrete mattresses or protection will be required where the Marine Scheme cable and Havhingsten Segment 2.1 South cable cross; • Preparation of the seabed will be required where the Marine Scheme cable and Havhingsten Segment 2.1 South cable cross; • Increase in suspended sediment concentrations; and • Water contamination.	• Cable burial depth to be of approximately 1.5 m.	No cumulative effects
		Ornithology • Temporary disturbance and displacement from installation activities associated with sound, visual impacts, and presence from vessel and construction activity	• Physical disturbance of the seabed during the route preparation and cable installation activities of both projects occurring concurrently will temporarily increase SSC (i.e. turbidity) and may subsequently result in sediment deposition and smothering of prey species;	• Consultation with the relevant operators; • Rationalise activity schedules; • Seabird observer will be utilised; and • A CEMP, Emergency Spill Response Plan and Waste Management Plan will be	**Negligible** which is **not significant.**

Marine Scheme Phase	Potential for Interaction	Potential Impact Pathways	Potential for Cumulative Effect	Mitigation	Significance of cumulative effect
		• Disturbance to seabed resulting in changes in prey availability; and • Alteration of water quality due to increased SSC, unplanned, releases, accidental leaks, and spills from vessels and plant	• Cable installation will disturb a small proportion of the total prey species in the area and the loss of prey will result in a low level of change for a short period of time; and • Any unplanned release of pollutants occurring at the same time has the potential to significantly alter water quality which in turn may affect any present waterbirds and/ or seabirds in the area. The likelihood of occurrence for accidental release/ spillage is low with control measures in place.	implemented during the installation phase of the project to minimise releases. Health, Safety, and Environment (HSE) procedures will also be implemented, with strict weather and personnel limits to reduce any risk of accidental spillage.	
		Marine Archaeology • Direct disturbance to the seabed causing damage; • Direct damage due to use of anchors by vessels; and • Indirect changes to hydrodynamic and sediment transport regimes	• Direct and indirect physical impacts on marine archaeology, due to similar effects from different elements of the proposed Marine Scheme, or cumulatively with those from other activities will in most cases be limited by the location and extent of sensitive receptors.	• Implementation and monitoring of Archaeological Exclusion Zones (AEZs) (up to 100 m around recorded position); • Pre-installation surveys, such as visual survey methods and UXO assessment; • Further geoarchaeological work, such as a stage one assessment of all the core logs or sampling and dating work; and • Offsetting any damage to archaeological assets.	**Negligible** which is **not significant**
		Shipping and Navigation • Vessel-to-vessel collision; • Deviation from established and identified vessel routes and areas; • Interaction with vessel anchors and anchoring activity;	• If construction activities overlap a temporary increase in vessel-to-vessel collision and vessel deviations is considered possible, particularly at or near the landfall.	• Consultation with the relevant operators; and • Rationalise activity schedules.	ALARP

Marine Scheme Phase	Potential for Interaction	Potential Impact Pathways	Potential for Cumulative Effect	Mitigation	Significance of cumulative effect
		• Interaction with fishing gear; • Reduction in under keel clearance; and • EMF results in magnetic compass deviation			
		Commercial Fisheries • Loss or restricted access to fishing grounds; and • Displacement of fishing activity into other areas	• Potential for potting/ creeling vessels and demersal trawlers to be affected during installation phases; and • Any temporary loss of fishing grounds and associated displacement as a result of construction works at these projects would be localised and short to medium term.	• Good practice mitigation measures such as a Fisheries Liaison and Co-existence Plan and Fisheries Management and Mitigation Strategy	**Minor** which is **not significant**
Operation	Any required repairs occurring at the same time.	Commercial Fisheries • Interference with fishing activities; • Snagging risk – loss or damage to fishing gear; and • Impacts on fishing as a result of impacts on commercial species	• Loss of grounds and associated displacement and increased snagging risk associated with cable projects would be for the most part limited to discrete areas where cable protection may be required and temporary advisory safety zones that may be in place at a given time.	• Advisory safety zones; and • Where the removal or relocation of static gear may be required during the installation phase, appropriate mitigation will be implemented for affected vessels following an evidence-based approach, in line with FLOWW guidance.	**Minor** which is **not significant**
Dunbar East Beach Sea Defence					
Installation	Dunbar East Beach is located close to the edge of the of the cumulative appraisal Study Area, approximately 9.5 km north-west of KP 1. There is potential for the construction phases of the two schemes to occur at the same time. However, at the time of	No potential impact pathways that could interact with Marine Scheme were identified with the Dunbar East Beach Sea Defence and so there is no potential for cumulative effects.			

Marine Scheme Phase	Potential for Interaction	Potential Impact Pathways	Potential for Cumulative Effect	Mitigation	Significance of cumulative effect
	writing, there is no clear timescale for the Dunbar East Beach Sea Defence scheme, which was initially proposed to be completed in 2020.				
SG1A Transmission Asset (for Seagreen 1 Offshore Windfarm), Neart Na Gaoithe Offshore Wind, Inch Cape Offshore Wind Farm, Havhingsten Segment 2.1 North					
Operation	During operation, additional long-term loss of fishing grounds and associated displacement as well as increased snagging risk	Commercial Fisheries • Interference with fishing activities; • Snagging risk – loss or damage to fishing gear; and • Impacts on fishing as a result of impacts on commercial species	Loss of grounds and associated displacement and increased snagging risk associated with cable projects would be for the most part limited to discrete areas where foundations are and where cable protection may be required, and temporary advisory safety zones that may be in place at a given time.	• Advisory safety zones; • Good practice mitigation measures such as a Fisheries Liaison and Co-existence Plan and Fisheries Management and Mitigation Strategy; and • Where the removal or relocation of static gear may be required during the installation phase, appropriate mitigation will be implemented for affected vessels following an evidence-based approach, in line with FLOWW guidance.	**Minor** and therefore **not significant**

16.5 Appraisal of In-Combination Effects

In-combination effects are where receptors could be affected by more than one type of impact. Where a receptor has been identified as only experiencing one effect or where only one topic has identified effects on that receptor, there is no potential for in-combination effects. Table 16-16 summaries how the receptor groups interact between chapters which shows that the receptors have been wholly appraised within single topic technical Chapters 7-15 of this EAR, and therefore no further consideration of in-combination effects is required within this appraisal.

Table 16-16: Screening for interaction between receptor groups and technical chapters

Receptors	Technical Chapters								
	Chapter 7 Physical Environment	Chapter 8 Benthic Ecology	Chapter 9 Fish and Shellfish	Chapter 10 Marine Mammals	Chapter 11 Ornithology	Chapter 12 Marine Archaeology	Chapter 13 Shipping and Navigation	Chapter 14 Commercial Fisheries	Chapter 15 Other Sea Users
Seabed and bedforms	✓								
Seabed morphology	✓								
Water column	✓								
Sea water quality	✓								
Metocean regime	✓								
Benthic Habitats – Subtidal sands and gravels		✓							
Subtidal mixed and coarse sediments		✓							
Mud habitats in deep water		✓							
Annex 1 Reef: stony, bedrock and *Sabellaria spinulosa*		✓							
Benthic Species - *Nephrops norvegicus*		✓							
Ocean quahog		✓							
Seapens and burrowing megafauna		✓							
Pelagic fish species			✓						

Receptors	Technical Chapters								
	Chapter 7 Physical Environment	Chapter 8 Benthic Ecology	Chapter 9 Fish and Shellfish	Chapter 10 Marine Mammals	Chapter 11 Ornithology	Chapter 12 Marine Archaeology	Chapter 13 Shipping and Navigation	Chapter 14 Commercial Fisheries	Chapter 15 Other Sea Users
Demersal fish species			✓						
Elasmobranch			✓						
Migratory Species			✓						
Shellfish			✓						
Harbour porpoise				✓					
Bottlenose dolphin				✓					
White-beaked dolphin				✓					
Minke whale				✓					
Habour seal				✓					
Grey seal				✓					
Puffin					✓				
Black-headed gull					✓				
Kittiwake					✓				
Guillemot					✓				
Common gull					✓				
Common tern					✓				
Shag					✓				
Herring gull					✓				
Little tern					✓				
Manx shearwater					✓				
Gannet					✓				
Razorbill					✓				
Roseate tern					✓				
Sandwich tern					✓				
Red-throated diver					✓				
Slavonian grebe					✓				

Receptors	Technical Chapters								
	Chapter 7 Physical Environment	Chapter 8 Benthic Ecology	Chapter 9 Fish and Shellfish	Chapter 10 Marine Mammals	Chapter 11 Ornithology	Chapter 12 Marine Archaeology	Chapter 13 Shipping and Navigation	Chapter 14 Commercial Fisheries	Chapter 15 Other Sea Users
Eider					✓				
Long-tailed duck					✓				
Common scoter					✓				
Velvet scoter					✓				
Goldeneye					✓				
Red-breasted merganser					✓				
Little gull					✓				
Non-breeding sea birds (guillemot, gulls and other auks)					✓				
Known and potential seabed prehistory receptors						✓			
Known and recorded maritime receptors and aviation receptors						✓			
Geophysical anomalies of possible anthropogenic origin						✓			
Currently unknown archaeological sites and artefacts						✓			
Shipping and Navigation							✓		
Demersal trawlers								✓	
Potter/creelers								✓	
Scallop dredgers								✓	

Receptors	Technical Chapters								
	Chapter 7 Physical Environment	Chapter 8 Benthic Ecology	Chapter 9 Fish and Shellfish	Chapter 10 Marine Mammals	Chapter 11 Ornithology	Chapter 12 Marine Archaeology	Chapter 13 Shipping and Navigation	Chapter 14 Commercial Fisheries	Chapter 15 Other Sea Users
Static gear fishing								✓	
Mobile fisheries								✓	
Recreational boaters									✓
Sea anglers									✓
Marine recreational users									✓
Oil and gas block owners									✓
MOD									✓
Aquaculture operators									✓
Cable asset owners									✓

16.6 Conclusion

The appraisal of cumulative effects resulting from the Marine Scheme and those projects identified in Table 16-4 has been appraised in accordance with the methodology laid out in Section 16.3.1. The cumulative effects identified through this appraisal have ranged from **negligible** to **minor** effects, which are **not significant**.

16.7 References

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