



# Scotland to England Green Link (SEGL) ~ Eastern Link 1

## Approach to Habitats Regulations Assessment

17<sup>th</sup> March 2021

For: National Grid and Scottish and Scottish Power Transmission

## Quality information

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## Revision History

Revision	Revision date	Details
Rev 0.1 – Rev 1.1	February – March 2021	Internal drafts
Rev 2.0	March 2021	Finalisation of Appendix C

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# 1. Habitat Regulations Assessment

## 1.1 Introduction

As part of the assessment of a proposed scheme it is necessary to consider whether the scheme is likely to have a significant effect on areas that have been internationally designated for nature conservation purposes (known as European sites: Special Areas of Conservation, Special Protection Areas and, as a matter of government policy, Ramsar sites). European sites are protected under the Conservation of Habitats and Species Regulations 2017 (as amended; relevant to England and Wales), the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended; relevant to Scotland) and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (as amended). The UK left the EU on 31 January 2020 under the terms set out in the European Union (Withdrawal Agreement) Act 2020 ("the Withdrawal Act"). However, the most recent amendments to the Habitats Regulations – the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 – make it clear that the need for HRA continues to apply.

There is no formal HRA Scoping stage. However, this HRA Scoping is undertaken as an initial step to help identify the European sites within the wider area of the scheme, the impact pathways likely associated with the proposals as understood at this time and whether a realistic connection between the impact pathways and ecological receptors is likely to exist. Ultimately, the objective of the Scoping Report is to inform the Likely Significant Effects (LSEs) screening assessment (the first stage of the HRA process). The LSE screening stage will identify which aspects of the scheme can be screened out from Appropriate Assessment (the second stage of the HRA process) because they are unlikely to result in adverse effects on European sites based on best available evidence.

Details on the construction process and specifications of the scheme are not yet available and a formal HRA screening (likely significant effects) exercise is not possible currently. Therefore, this Scoping Report also outlines the additional information to be collected concerning project delivery and highlights data collection to fill any gaps in the ecological evidence base needed for the subsequent LSEs screening and Appropriate Assessment stages of the HRA.

Once the HRA is progressed to Stage 1 (Test of Likely Significant Effects), it will be carried out with reference to the general EC guidance on HRA (European Commission, 2001), general guidance on HRA published by the UK government in July 2019 (Ministry of Housing, Communities & Local Government, 2019) and HRA guidance provided by NatureScot and Planning Inspectorate (PINS) Advice Note 10 (The Planning Inspectorate, 2017). Furthermore, due regard will be given to all relevant case law relating to the 2017 Regulations, the Habitats Directive and Birds Directive. This includes the ruling by the Court of Justice of the European Union (CJEU) in the case of *People Over Wind, Peter Sweetman v Coillte Teoranta (C-323/17)*. This case held that; "it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on that site" (paragraph 40). This establishes that bespoke mitigation measures cannot be taken into account at the LSEs stage and instead must be considered in an Appropriate Assessment. Additional case law is relevant, including the *Holohan* ruling<sup>1</sup> which was also handed down by the European Court of Justice in 2018. Among other provisions, the ruling underlined the need to consider effects on functionally-linked habitat (i.e. habitat outside the boundaries of a European site but which is essential for achieving the conservation objectives of that European site). This is relevant for European designated for highly mobile species.

Furthermore, any uncertainties regarding the delivery of the scheme will be accounted for by using the Rochdale Envelope. This has arisen from two cases: *R. v Rochdale MBC ex parte Milne (No.1)* and *R. v Rochdale MBC ex parte Tew [1999]*, which are cases that dealt with outline planning applications for a proposed business park in Rochdale.

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<sup>1</sup> Case C-461/17

## 1.2 European Designated Sites

The indicative alignment passes directly through two European sites: The Outer Firth of Forth & St Andrews Bay Complex SPA as it leaves the Scottish landfall and a small section of the Northumberland Marine SPA as it heads past Holy Island south of Berwick-upon-Tweed:

- Outer Firth of Forth and St Andrews Bay Complex SPA (Scotland)** – This is an extensive site (2,720.68 km<sup>2</sup>) off the south-east coast of Scotland, harbouring one of the most abundant and diverse marine bird assemblages in Scotland. It is designated for 21 seabird and waterbird species, including both breeding and overwintering species. The site harbours particularly large proportions of the GB populations for common eider *Somateria mollissima mollissima* (35.9%), long-tailed duck *Clangula hyemalis* (17.7%), velvet scoter *Melanitta fusca* (23.2%), common tern *Sterna hirundo* (8.8%, breeding) and Atlantic puffin *Fratercula arctica* (5.3%). A seabird assemblage of 40,000 seabirds also forms a qualifying feature of the site. Importantly, the SPA also includes marine foraging grounds for breeding common tern, Arctic tern and European shag nesting in SPA colonies within the Outer Firth of Forth and St Andrews Bay Complex SPA. The cable alignment runs through the SPA for approximately 17.2 km.
- Northumberland Marine SPA (England)** - This SPA is designated for a range of breeding birds, including Arctic tern *Sterna paradisaea*, Common tern *Sterna hirundo*, Guillemot *Uria aalge*, Little tern *Sternula albifrons*, Puffin *Fratercula arctica*, Roseate tern *Sterna dougallii* and Sandwich tern *Thalasseus sandvicensis*. A wider seabird assemblage (breeding) also forms part of the designation. The cable alignment runs through the SPA for a distance of approximately 6.3 km and elsewhere, the cable alignment is parallel to the eastern boundary of the SPA (approximately 600 m at the closest points which are east of Seahouses and Amble on the Northumberland coast).

Various other European sites lie outside the anticipated Project Marine Scheme development footprint but may nonetheless be impacted by the indicative alignment. For example, this could be because these sites harbour mobile bird, fish or mammal species for which European sites are designated and which potentially frequent the scheme area, or due to impact pathways extending some distance beyond the Marine Working Area.

This is presented below in **Table 1**.

**Table 1 Summary of the European sites traversed by or within the likely Zone of Influence (Zol) of the Project Marine Scheme**

European site (Country)	Approx. distance from the indicative alignment	Qualifying Species / Habitats	Threats and Pressures to Site Integrity	Likely Connection to Impact Pathways from The Project Marine Scheme
Outer Firth of Forth and St Andrews Bay Complex SPA (Scotland)	The cable runs through this marine SPA for a distance of approx. 17.2 km	<p><u>Non-breeding waterfowl</u></p> <ul style="list-style-type: none"> <li>• Red-throated diver <i>Gavia stellate</i> (5% of the GB population)</li> <li>• Slavonian grebe <i>Podiceps auratus</i> (2.7% of the GB population)</li> <li>• Common eider <i>Somateria mollissima mollissima</i> (35.9% of the GB population)</li> <li>• Long-tailed duck <i>Clangula hyemalis</i> (17.7% of the GB population)</li> <li>• Common scoter <i>Melanitta nigra</i> (4.7% of the GB population)</li> <li>• Velvet scoter <i>Melanitta fusca</i> (23.2% of the GB population)</li> <li>• Common goldeneye <i>Bucephala clangula</i> (2.9% of the GB population)</li> <li>• Red-breasted merganser <i>Mergus serrator</i> (5.1% of the GB population)</li> <li>• Waterfowl assemblage of more than 20,000 seabirds in any season (Article 4.2)</li> </ul> <p><u>Breeding and Non-breeding seabirds</u></p> <ul style="list-style-type: none"> <li>• Common tern <i>Sterna hirundo</i> (8.8% of the GB population; breeding)</li> <li>• Arctic tern <i>Sterna paradisaea</i> (1% of the GB population; breeding)</li> <li>• European shag <i>Phalacrocorax aristotelis</i> (4.6% / 2.2% of the GB population; breeding / non-breeding)</li> <li>• Northern gannet <i>Morus bassanus</i> (2.5% of the GB population; breeding)</li> <li>• Atlantic puffin <i>Fratercula arctica</i> (5.3% of the GB population; breeding)</li> </ul>	<ul style="list-style-type: none"> <li>• Recreational disturbance</li> <li>• Visual and noise disturbance</li> <li>• Marine consents and permits</li> <li>• Fisheries: Commercial marine and estuarine</li> <li>• Water pollution</li> </ul>	<p>Yes – mobile bird species present throughout the year, likely foraging, preening or loafing in marine waters around the indicative alignment.</p> <p>Seabirds can travel very long distances to forage from their colonies. Gannet, puffin and kittiwake can routinely travel 200-500km to forage depending on species. For seabirds JNCC advises that the mean maximum foraging range + 1 standard deviation should be applied for the purposes of defining functional linkage.</p>

European site (Country)	Approx. distance from the indicative alignment	Qualifying Species / Habitats	Threats and Pressures to Site Integrity	Likely Connection to Impact Pathways from The Project Marine Scheme
		<ul style="list-style-type: none"> <li>• Black-legged kittiwake <i>Rissa tridactyla</i> (1.6% of the GB population; breeding / non-breeding)</li> <li>• Manx shearwater <i>Puffinus puffinus</i> (present during breeding season, but not breeding)</li> <li>• Common guillemot <i>Uria aalge</i> (NA)</li> <li>• Razorbill <i>Alca torda</i> (NA)</li> <li>• Herring gull <i>Larus argentatus</i> (1.7% of the GB population)</li> <li>• Little gull <i>Larus minutus</i> (NA)</li> <li>• Black-headed gull <i>Chroicocephalus ridibundus</i> (1.2% of the GB population)</li> <li>• Common gull <i>Larus canus</i> (2.1% of the GB population)</li> <li>• Seabird assemblage of more than 20,000 seabirds in the breeding season (Article 4.2)</li> <li>• Seabird assemblage of more than 20,000 seabirds in the non-breeding season (Article 4.2)</li> </ul>		
St Abb's Head to Fast Castle SPA (including its marine extension; Scotland)	2 km to the south-west	<ul style="list-style-type: none"> <li>• Razorbill <i>Alca torda</i> (1% of the GB population)</li> <li>• Common guillemot <i>Uria aalge</i> (3% of the GB population)</li> <li>• Black-legged kittiwake <i>Rissa tridactyla</i> (4% of the GB population)</li> <li>• Herring gull <i>Larus argentatus</i> (0.7% of the GB population)</li> <li>• European shag <i>Phalacrocorax aristotelis</i> (1% of the GB population)</li> <li>• Seabird assemblage of more than 20,000 seabirds in any season (Article 4.2)</li> </ul>	<ul style="list-style-type: none"> <li>• Recreational disturbance</li> <li>• Visual and noise disturbance</li> <li>• Marine consents and permits</li> <li>• Fisheries: Commercial marine and estuarine</li> <li>• Water pollution</li> </ul>	<p>Yes – mobile bird species present throughout the year, likely foraging, preening or loafing in marine waters around the indicative alignment.</p> <p>Seabirds can travel very long distances to forage from their colonies. Kittiwake can routinely travel over 100km from their colonies to forage. For seabirds JNCC advises that the mean maximum foraging range + 1 standard deviation should be applied for the purposes of defining functional linkage.</p>

European site (Country)	Approx. distance from the indicative alignment	Qualifying Species / Habitats	Threats and Pressures to Site Integrity	Likely Connection to Impact Pathways from The Project Marine Scheme
St Abb's Head to Fast Castle SAC	2 km to the south-west	<ul style="list-style-type: none"> <li>• Vegetated sea cliffs of the Atlantic &amp; Baltic coasts</li> </ul>	<ul style="list-style-type: none"> <li>• Trampling damage</li> <li>• Air quality</li> </ul>	No – no connection to EL1
Berwickshire and North Northumberland Coast SAC (Scotland / England)	563 m to the south-west	<ul style="list-style-type: none"> <li>• Mudflats and sandflats not covered by seawater at low tide</li> <li>• Large shallow inlets and bays</li> <li>• Reefs</li> <li>• Submerged or partially submerged sea caves</li> <li>• Grey seal <i>Halichoerus grypus</i> (Annex II species)</li> </ul>	<ul style="list-style-type: none"> <li>• Abrasion to reefs and other SAC habitats</li> <li>• Sediment displacement and increased turbidity</li> <li>• Public access / disturbance</li> <li>• Water pollution</li> <li>• Changes in species distributions</li> <li>• Coastal squeeze</li> <li>• Transportation and service corridors</li> <li>• Air pollution: Risk of atmospheric nitrogen deposition</li> <li>• Fisheries: Commercial marine and estuarine</li> </ul>	<p>Yes (SAC Species) – mobile grey seal present within the SAC, likely using waters around the indicative alignment as these overlap with the marine mammal Management Unit in which the SAC lies.</p> <p>No (SAC Habitats) – unlikely to be affected due to the distance to the Marine Working Area</p>
Tweed Estuary SAC (England)	12.5 km to the west	<ul style="list-style-type: none"> <li>• Estuaries</li> <li>• Mudflats and sandflats not covered by seawater at low tide</li> <li>• Sea lamprey <i>Petromyzon marinus</i> (Annex II species)</li> <li>• River lamprey <i>Lampetra fluviatilis</i> (Annex II species)</li> </ul>	<ul style="list-style-type: none"> <li>• Abrasion to reefs and other SAC habitats</li> <li>• Sediment displacement and increased turbidity</li> <li>• Public access / disturbance</li> <li>• Water pollution</li> <li>• Changes in species distributions</li> <li>• Coastal squeeze</li> <li>• Transportation and service corridors</li> <li>• Air pollution: Risk of atmospheric nitrogen deposition</li> <li>• Fisheries: Commercial marine and estuarine</li> </ul>	<p>Yes (SAC Species) – migratory sea lamprey present within the SAC, likely also using marine waters around the indicative alignment.</p> <p>No (SAC Habitats) – unlikely to be affected due to the distance to the Marine Working Area</p>



European site (Country)	Approx. distance from the indicative alignment	Qualifying Species / Habitats	Threats and Pressures to Site Integrity	Likely Connection to Impact Pathways from The Project Marine Scheme
River Tweed SAC (England)	13 km to the west	<ul style="list-style-type: none"> <li>Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation</li> <li>Atlantic salmon <i>Salmo salar</i> (Annex II species)</li> <li>Sea lamprey <i>Petromyzon marinus</i> (Annex II species)</li> <li>River lamprey <i>Lampetra fluviatilis</i> (Annex II species)</li> <li>Brook lamprey <i>Lampetra planeri</i> (Annex II species)</li> </ul>	<ul style="list-style-type: none"> <li>Sediment displacement and increased turbidity</li> <li>Water pollution</li> <li>Changes in species distributions</li> <li>Fisheries: Commercial marine and estuarine</li> </ul>	<p>Yes (SAC Species) – migratory sea lamprey and salmon present within the SAC, likely also using marine waters around the indicative alignment.</p> <p>No (SAC Habitats) – unlikely to be affected due to the distance to the Marine Working Area</p>
Northumberland SPA (England)	The cable runs through this marine SPA for a distance of approx. 6.3 km	<ul style="list-style-type: none"> <li>Arctic tern <i>Sterna paradisaea</i> (9% of the breeding GB population)</li> <li>Common tern <i>Sterna hirundo</i> (12.9% of the GB population)</li> <li>Guillemot <i>Uria aalge</i> (1.7% of the GB population)</li> <li>Little tern <i>Sterna albifrons</i> (2.4% of the GB population)</li> <li>Atlantic puffin <i>Fratercula arctica</i> (1.1% of the GB population)</li> <li>Roseate tern <i>Sterna dougalii</i> (93% of the GB population)</li> <li>Sandwich tern <i>Sterna sandvicensis</i> (19.7% of the GB population)</li> <li>Seabird assemblage of more than 20,000 seabirds in any season (Article 4.2)</li> </ul>	<ul style="list-style-type: none"> <li>Recreational disturbance</li> <li>Visual and noise disturbance</li> <li>Marine consents and permits</li> <li>Fisheries: Commercial marine and estuarine</li> <li>Water pollution</li> </ul>	<p>Yes – mobile bird species present during the breeding season, likely foraging, preening or loafing in marine waters around the indicative alignment.</p> <p>Seabirds can travel very long distances to forage from their colonies. Puffin can routinely travel over 200km to forage. For seabirds JNCC advises that the mean maximum foraging range + 1 standard deviation should be applied for the purposes of defining functional linkage.</p>
Lindisfarne SPA / Ramsar (England)	9.2 km to the south-east	<ul style="list-style-type: none"> <li>Bar-tailed godwit <i>Limosa lapponica</i> (12% of the GB population)</li> <li>Common scoter <i>Melanitta nigra</i> (2% of the GB population)</li> <li>Dunlin <i>Calidris alpina alpina</i> (2% of the GB population)</li> <li>Eider <i>Somateria mollissima</i> (5% of the GB population)</li> </ul>	<ul style="list-style-type: none"> <li>Sediment displacement and increased turbidity</li> <li>Public access / disturbance</li> <li>Water pollution</li> <li>Changes in species distributions</li> <li>Coastal squeeze</li> </ul>	<p>Yes – some of the qualifying bird species (present throughout the year) forage in the marine water column; some sea ducks will utilise marine waters far from the SPA / Ramsar.</p>

European site (Country)	Approx. distance from the indicative alignment	Qualifying Species / Habitats	Threats and Pressures to Site Integrity	Likely Connection to Impact Pathways from The Project Marine Scheme
		<ul style="list-style-type: none"> <li>• Golden plover <i>Pluvialis apricaria</i> (1% of the GB population)</li> <li>• Grey plover <i>Pluvialis squatarola</i> (7% of the GB population)</li> <li>• Greylag goose <i>Anser anser</i> (3% of the GB population)</li> <li>• Light-bellied brent goose <i>Branta bernicla hrota</i> (77% of the GB population)</li> <li>• Little tern <i>Sterna albifrons</i> (2% of the GB population; breeding)</li> <li>• Long-tailed duck <i>Clangula hyemalis</i> (NA)</li> <li>• Red-breasted merganser <i>Mergus serrator</i> (1% of the GB population)</li> <li>• Redshank <i>Tringa totanus</i> (3% of the GB population)</li> <li>• Ringed plover <i>Charadrius hiaticula</i> (2% of the GB population)</li> <li>• Roseate tern <i>Sterna dougallii</i> (5% of the GB population; breeding)</li> <li>• Sanderling <i>Calidris alba</i> (1% of the GB population)</li> <li>• Shelduck <i>Tadorna tadorna</i> (1% of the GB population)</li> <li>• Whooper swan <i>Cygnus cygnus</i> (2% of the GB population)</li> <li>• Wigeon <i>Anas penelope</i> (2% of the GB population)</li> <li>• Seabird assemblage of more than 20,000 seabirds in any season (Article 4.2)</li> <li>• Extensive intertidal flats, large area of saltmarsh and a major sand dune system (Ramsar Criterion 1)</li> <li>• Pink-footed goose <i>Anser brachyrhynchus</i> (1% of the GB population) (Ramsar Criterion 6)</li> </ul>	<ul style="list-style-type: none"> <li>• Transportation and service corridors</li> <li>• Air pollution: Risk of atmospheric nitrogen deposition</li> <li>• Fisheries: Commercial marine and estuarine</li> </ul>	

European site (Country)	Approx. distance from the indicative alignment	Qualifying Species / Habitats	Threats and Pressures to Site Integrity	Likely Connection to Impact Pathways from The Project Marine Scheme
Northumbria Coast SPA / Ramsar (England)	421 m to the north of the proposed landfall site near Seaham	<ul style="list-style-type: none"> <li>Arctic tern <i>Sterna paradisaea</i> (2.9% of the GB population)</li> <li>Little tern <i>Sterna albifrons</i> (1.7% of the GB population)</li> <li>Purple sandpiper <i>Calidris maritima</i> (1.6% of the biogeographic population)</li> <li>Turnstone <i>Arenaria interpres</i> (2.6% of the biogeographic population)</li> </ul>	<ul style="list-style-type: none"> <li>Sediment displacement and increased turbidity</li> <li>Public access / disturbance</li> <li>Water pollution</li> <li>Changes in species distributions</li> <li>Coastal squeeze</li> <li>Transportation and service corridors</li> <li>Air pollution: Risk of atmospheric nitrogen deposition</li> <li>Fisheries: Commercial marine and estuarine</li> </ul>	Yes – mobile bird species present during the breeding season (terns) and the overwintering period. While the little tern and Arctic tern are restricted to known breeding locations (Long Nanny), parts of the SPA / Ramsar lie in close proximity to the proposed landfill site north of Seaham (potential disturbance to foraging purple sandpiper and turnstone)
Durham Coast SAC	421 m to the north of the proposed landfall site near Seaham	<ul style="list-style-type: none"> <li>Vegetated sea cliffs</li> </ul>	<ul style="list-style-type: none"> <li>Air pollution: Risk of atmospheric nitrogen deposition</li> <li>Recreational trampling</li> </ul>	No – No connection to EL1
Farne Islands SPA (England)	Closest island (Knivestone) 7.1 km to the south-west	<ul style="list-style-type: none"> <li>Arctic tern <i>Sterna paradisaea</i> (NA)</li> <li>Common tern <i>Sterna hirundo</i> (NA)</li> <li>Guillemot <i>Uria aalge</i> (NA)</li> <li>Roseate tern <i>Sterna dougallii</i> (NA)</li> <li>Sandwich tern <i>Sterna sandvicensis</i> (NA)</li> <li>Seabird assemblage of more than 20,000 seabirds in any season (Article 4.2)</li> </ul>	<ul style="list-style-type: none"> <li>Sediment displacement and increased turbidity</li> <li>Public access / disturbance</li> <li>Water pollution</li> <li>Changes in species distributions</li> <li>Coastal squeeze</li> <li>Transportation and service corridors</li> <li>Air pollution: Risk of atmospheric nitrogen deposition</li> <li>Fisheries: Commercial marine and estuarine</li> </ul>	<p>Yes – mobile bird species present during the breeding season, likely foraging, preening or loafing in marine waters around the indicative alignment.</p> <p>Seabirds like guillemot can routinely travel over 100km to forage from their colonies depending on species. For seabirds JNCC advises that the mean maximum foraging range + 1 standard deviation should be applied for the purposes of defining functional linkage.</p>

European site (Country)			Approx. distance from the indicative alignment	Qualifying Species / Habitats	Threats and Pressures to Site Integrity	Likely Connection to Impact Pathways from The Project Marine Scheme
Coquet Island SPA (England)			14.6 km to the west	<ul style="list-style-type: none"> <li>Arctic tern <i>Sterna paradisaea</i> (NA)</li> <li>Common tern <i>Sterna hirundo</i> (NA)</li> <li>Roseate tern <i>Sterna dougallii</i> (NA)</li> <li>Sandwich tern <i>Strena sandvicensis</i> (NA)</li> <li>Seabird assemblage of more than 20,000 seabirds in any season (Article 4.2)</li> </ul>	<ul style="list-style-type: none"> <li>Sediment displacement and increased turbidity</li> <li>Public access / disturbance</li> <li>Water pollution</li> <li>Changes in species distributions</li> <li>Coastal squeeze</li> <li>Transportation and service corridors</li> <li>Air pollution: Risk of atmospheric nitrogen deposition</li> <li>Fisheries: Commercial marine and estuarine</li> </ul>	Yes – mobile bird species present during the breeding season, likely foraging, preening or loafing in marine waters around the indicative alignment
Southern North Sea SAC (England)			>100 km to the east	<ul style="list-style-type: none"> <li>Harbour porpoise <i>Phocoena phocoena</i> (Annex II species)</li> </ul>	<ul style="list-style-type: none"> <li>Visual and noise disturbance</li> <li>Marine consents and permits</li> <li>Fisheries: Commercial marine and estuarine</li> <li>Water pollution</li> </ul>	Yes – harbour porpoise are mobile cetaceans that may use the marine waters around the indicative alignment for foraging as the SAC and potential Marine Working Area are in the same marine mammal Management Unit. Moreover, works can affect marine mammals at significant distances. JNCC advises that underwater noise can cause significant effects up to 50km distant.
Dogger Bank SAC (England)			>100 km to the east	<ul style="list-style-type: none"> <li>Sandbanks which are slightly covered by sea water all the time</li> </ul>	<ul style="list-style-type: none"> <li>Abrasion to sandbanks</li> <li>Sediment displacement and increased turbidity</li> <li>Transportation and service corridors</li> </ul>	No – the SAC lies over 100km from the Marine Working Area and is not designated for mobile qualifying species

## 1.3 Appraisal of impact pathways and their potential effects on European sites

**Table 2** below provides an overview of the most likely impact pathways associated with the installation and operation of subsea high-voltage power cables as it is understood at this time. Note that due to the early development stage of the project, the likely importance of many of these impact pathways is subject to change. The impact pathways were identified using prior ecological knowledge, appraising the sensitivity of European sites, and considering Scoping Reports for other schemes<sup>[1]</sup> as well as published academic research articles (e.g. see Taormina et al., 2018 for a thorough review of the ecological effects of submarine power cables<sup>[2]</sup>).

**Table 2 Likely impact pathways associated with the installation and operation of the Project Marine Scheme**

Stage of Development	Impact Pathways	Details	Zone of Influence (Zol)	Potentially Impacted European Sites
Installation	Temporary habitat loss from marine SPAs	There will be direct temporary habitat loss along the 176 km of subsea cable burial, although this effect will not occur along the entire stretch of the cable at the same time.	NA	<ul style="list-style-type: none"> <li>• Outer Firth of Forth and St Andrews Bay Complex SPA (Scotland)</li> <li>• Northumberland Marine SPA (England)</li> </ul>
	Visual and noise disturbance arising from cable burial (within SPAs and areas likely to represent functionally linked habitat)	Regardless of the installation method used, visual and noise (airborne and underwater) disturbance will occur within designated sites (see above) and areas that are functionally linked to Noise from subsea cable installations is significantly lower than from other anthropogenic sources (sonar, impact piling or explosions). Notwithstanding this, any noise impacts will require detailed consideration.	Potentially several hundred metres from the Marine Working Area, or up to 50 km for marine mammals on advice of JNCC	<ul style="list-style-type: none"> <li>• Outer Firth of Forth and St Andrews Bay Complex SPA</li> <li>• Northumberland Marine SPA (England)</li> <li>• St Abb's Head to Fast Castle SPA</li> <li>• Berwickshire and North Northumberland Coast SAC</li> <li>• Tweed Estuary SAC</li> <li>• Lindisfarne SPA / Ramsar</li> <li>• Northumbria Coast SPA / Ramsar</li> <li>• Farne Islands SPA</li> <li>• Coquet Island SPA</li> <li>• Southern North Sea SAC</li> </ul>
	Sediment disturbance / resuspension of sediment	<p>Depending on the nature of the seafloor, sediment reworking through ploughing, jetting or cutting-wheels can lead to turbid plumes of several hectares, which persist between several hours to days. While this effect may impede predators that hunt visually (e.g. seabirds and grey seal), such effects are likely to be localised and transient.</p> <p>As a general rule, impacts from hydrodynamic changes (i.e. erosion), sediment disturbance and sediment transport at any designated site that lies more than the distance of one tidal ellipse away from a marine plan area boundary are unlikely to arise in practice. This is based on evidence from plume studies that even fine particles mobilised from the seabed settle out again to a large extent within the distance of one tidal excursion. The</p>	Several hectares surrounding the Marine Working Area	<ul style="list-style-type: none"> <li>• Outer Firth of Forth and St Andrews Bay Complex SPA</li> <li>• Northumberland Marine SPA (England)</li> <li>• St Abb's Head to Fast Castle SPA</li> <li>• Berwickshire and North Northumberland Coast SAC</li> <li>• Tweed Estuary SAC</li> <li>• Lindisfarne SPA / Ramsar</li> <li>• Northumbria Coast SPA / Ramsar</li> </ul>

		average distance over which there could be a potential indirect effect, as defined by an average tidal ellipse, is around 10-15 km.		<ul style="list-style-type: none"> <li>• Farne Islands SPA</li> <li>• Coquet Island SPA</li> </ul>
	Water quality	During construction there is a risk of resuspension of buried contaminants (e.g. heavy metals, hydrocarbons) into the surrounding water column. Furthermore, there is a potential for ships and hydraulic equipment to result in accidental oil leakages / spillages during cable laying.	Several hectares surrounding the Marine Working Area	<ul style="list-style-type: none"> <li>• Outer Firth of Forth and St Andrews Bay Complex SPA</li> <li>• Northumberland Marine SPA (England)</li> <li>• St Abb's Head to Fast Castle SPA</li> <li>• Berwickshire and North Northumberland Coast SAC</li> <li>• Tweed Estuary SAC</li> <li>• Lindisfarne SPA / Ramsar</li> <li>• Northumbria Coast SPA / Ramsar</li> <li>• Farne Islands SPA</li> <li>• Coquet Island SPA</li> </ul>
Operation	Electromagnetic field (EMF) impacts	EMF effects are of potential concern regarding certain species of fish and marine mammals. For example, magnetic fields have been observed to reduce swimming speed in European eel <i>Anguilla Anguilla</i> in some circumstances.	From sheath of the cable to tens of metres distance (depending on voltage of the HVDC cable)	<ul style="list-style-type: none"> <li>• Berwickshire and North Northumberland Coast SAC</li> <li>• River Tweed SAC</li> <li>• Tweed Estuary SAC</li> <li>• Southern North Sea SAC</li> </ul>
	Cable heat emission	The transport of electricity will lead to an increase in temperature at the cable surface, potentially warming the surrounding water and sediment in direct contact with the cable. One study showed that a maximum temperature increase of 2.5 °C was observed 50 cm from the HVDC cable. However, this warming effect is unlikely to materially affect the water column (due to dissipation of heat from continual water flow).	From sheath of the cable to tens of centimetres distance (depending on voltage of the HVDC cable)	<ul style="list-style-type: none"> <li>• Outer Firth of Forth &amp; St Andrews Bay Complex SPA</li> <li>• Northumberland Marine SPA</li> </ul>

<sup>[1]</sup> E.g. North Connect undertook a Scoping Report for a HVDC cable route between Peterhead (Scotland) and Norway. Available at: [http://marine.gov.scot/sites/default/files/north\\_connect\\_scoping\\_report.pdf](http://marine.gov.scot/sites/default/files/north_connect_scoping_report.pdf) [Accessed on the 20/01/2021]

<sup>[2]</sup> Taormina B., Bald J., Want A., Thouzeau G., Lejart M., Desroy N. & Carlier A. (2018). A review of potential impacts of submarine power cables on the marine environment: Knowledge gaps, recommendations and future directions. *Renewable and Sustainable Energy Reviews* **96**: 380-391.

## 1.4 HRA Scoping Summary

At this stage it is impossible to conclude no Likely Significant Effects for any European sites, although it seems very possible a conclusion of no Likely Significant Effects could be drawn for the St Abb's Head to Fast Castle SAC and the Durham Coast SAC due to an absence of impact pathways linking the development to their vegetated sea cliffs.

## 1.5 Information to inform an Appropriate Assessment

The environmental assessment will include sufficient information to develop a detailed cable laying methodology for each habitat found along the cable route and include a consideration of potential cable protection, both within and outside of designated sites. Where required to investigate impacts on European sites information will be obtained regarding construction noise (both in atmosphere and underwater), operational noise, construction working methods and potential for effects on sediment processes. Best practice should also be adopted for the wider area to minimise the potential for adverse effects on integrity.





