Department for
Business, Energy
& Industrial Strategy

AQUIND INTERCONNECTOR HABITATS REGULATIONS ASSESSMENT

Regulation 63 of the Conservation of Habitats and Species Regulations 2017, and

Regulation 28 of the Conservation of Offshore Marine Habitats and Species Regulations 2017

January 2022

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1. Introduction

1.1. Background

This is a record of the Habitats Regulations Assessment ("HRA") that the Secretary of State for Business, Energy and Industrial Strategy has undertaken under the Conservation of Habitats and Species Regulations 2017 ("the Habitats Regulations") and the Conservation of Offshore Marine Habitats and Species Regulations 2017 ("the Offshore Habitats Regulations") in respect of the Development Consent Order ("DCO") and Deemed Marine Licences ("dMLs") for the Aquind Interconnector and its associated development (the "Project"). For the purposes of these Regulations the Secretary of State is the competent authority (under the Habitats Regulations and the Offshore Habitats Regulations).

The planning application ("the Application") proposes the construction, operation, maintenance and decommissioning of a 2,000 MW bi-directional electrical power transmission link (an interconnector) between Normandy in France and Lovedean in Hampshire. The Project will have the capacity to transmit 16,000,000 MWhrs of electricity per year, which equates to approximately 5% of the UK's current annual electricity consumption.

The Application was submitted under section 37 of the Planning Act 2008 ("PA2008") and was received in full by the Planning Inspectorate ("PINS") on 14 November 2019.

The Project was accepted by PINS under section 55 of the PA2008 on 12 December 2019 and a three-member Panel of Inspectors ("the Panel") was appointed as the Examining Authority ("ExA") for the application. The Examination of the Application began on 8 September 2020 and completed on 8 March 2021. The Panel submitted its report of the Examination, including its recommendation ("the ExA's Report"), to the Secretary of State on 8 June 2021.

1.2. Habitats Regulations Assessment (HRA)

The Habitats Regulations and the Offshore Habitats Regulations aim to ensure the long-term conservation of certain species and habitats by protecting them from possible adverse effects of plans and projects. The Habitats Regulations cover England and Wales including their inshore waters up to 12 nautical miles ("nm"). Beyond 12 nm, the Offshore Habitats Regulations serve the same function for the UK's offshore marine area.

The Habitats Regulations provide for the designation of sites for the protection of habitats and species of international importance. These sites are called Special Areas of Conservation ("SACs"). The Regulations also provide for the classification of sites for the protection of rare and vulnerable birds and for regularly occurring migratory species within the UK and internationally. These sites are called Special Protection Areas ("SPAs"). SACs and SPAs together, referred to as European sites in legislation, form part of the UK's national site network.

The Convention on Wetlands of International Importance 1972 ("the Ramsar Convention") provides for the listing of wetlands of international importance. These sites are called Ramsar sites. Government policy is to afford Ramsar sites in the United Kingdom the same protection as sites within the national site network (collectively referred to in this HRA as "protected sites").

Regulation 63 of the Conservation of Habitats and Species Regulations 2017 provides that:

….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, [the competent authority] must make an appropriate assessment of the implications for that site in view of that site's conservation objectives.

And that: *In the light of the conclusions of the assessment, and subject to regulation 64 [IROPI], the competent authority may agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European site or the European offshore marine site (as the case may be).*

Regulation 28 of the Conservation of Offshore Marine Habitats and Species Regulations 2017 contains similar provisions:

Before deciding to undertake, or give any consent, permission or other authorisation for, a relevant plan or project, a competent authority must make an appropriate assessment of the implications of the plan or project for the site in view of that site's conservation objectives.

And that:

In the light of the conclusions of the assessment, and subject to regulation 29 [IROPI], the competent authority may agree to the plan or project only if it has ascertained that it will not adversely affect the integrity of the European offshore marine site or European site (as the case may be).

This Application is not directly connected with, or necessary to, the management of a protected site. The Habitats Regulations require the Secretary of State to consider whether the project is likely to have a significant effect ("LSE") on any such site, alone or in-combination with other plans and projects. Where the potential for LSE cannot be excluded, an appropriate assessment ("AA") of the implications of the project for that site in view of its conservation objectives must be completed. Therefore, the Secretary of State must determine whether the project will have an adverse effect on the integrity of the site(s). In this document, the first stage assessment of LSEs and, where required, the second stage assessment ("the AA") to determine whether there is an adverse effect on the integrity of a site, are collectively referred to as the Habitats Regulations Assessment ("HRA"). The HRA refers only to sites within UK jurisdiction.

1.3. RIES and Statutory Consultation

Under the Habitats Regulations and the Offshore Habitats Regulations the competent authority must, for the purposes of an AA, consult the appropriate nature conservation body and have regard to any representation made by that body within such reasonable time as the authority specifies.

Natural England ("NE") is the Statutory Nature Conservation Body ("SNCB") for England and for English waters within the 12 nm limit. The Joint Nature Conservation Committee ("JNCC") is the SNCB beyond 12 nm, but this duty has been discharged by NE following the 2013 Triennial Review of both organisations[1] [2]. However, JNCC retains responsibility as the statutory advisor for protected sites that are located outside the territorial sea and UK internal waters (i.e. more than 12 nm offshore) and as such continues to provide advice to NE on the significance of any potential effects on interest features of such sites.

The ExA prepared a Report on the Implications for European Sites ("RIES"), with support from the Planning Inspectorate's Environmental Services Team. The RIES was based on matrices provided by the Applicant and relevant information provided by Interested Parties. The RIES documented the information received during the Examination (up until 3 February 2021) and presented the ExA's understanding of the main facts regarding the HRA to be carried out by the Secretary of State.

The RIES was published on PINS planning portal website and the ExA notified Interested Parties that it had been published. Consultation on the RIES was undertaken between 3 February 2021 and 1 March 2021. The RIES was issued to ensure that Interested Parties, including the SNCBs, were consulted

[1] https://www.gov.uk/government/publications/triennial-review-of-the-environment-agency-ea-and-natural-england-ne

[2] https://www.gov.uk/government/publications/triennial-review-of-the-joint-nature-conservation-committee-jncc

formally on habitat regulations matters, as required under regulation 63(3) of the Habitats Regulations and regulation 28(4) of the Offshore Habitats Regulations.

The Secretary of State is content to accept the ExA's recommendation that the RIES, and consultation on it, represents an appropriate body of information to enable the Secretary of State to fulfil his duties in respect of the UK's national site network.

In addition, this HRA has been compiled using evidence from the application documents and consultation responses, which are available on the Planning Inspectorate's Nationally Significant Infrastructure Project web pages[3]. In particular:

- The ExA's Report
- The Applicant's ES
- The Applicant's Habitats Regulations Assessment Report

Key information from these documents is summarised in this HRA.

[3] https://infrastructure.planninginspectorate.gov.uk/projects/south-east/aquind-interconnector/?ipcsection=docs

2. Development Description

The Project is comprised of the construction, operation, maintenance and decommissioning of a 2,000 MW bi-directional electrical power transmission link from the boundary of the UK Exclusive Economic Zone ("EEZ") in the English Channel to Lovedean in Hampshire, via a landfall at Eastney on Portsea Island, together with a connection to an existing substation and associated infrastructure. From the EEZ boundary to Normandy in France, the remainder of the proposals are subject to equivalent French consents. In the UK, the Project comprises the following main components:

- The marine interconnector cable consisting of two high voltage direct current ("HVDC") circuits from the boundary of the UK Exclusive Economic Zone ("EEZ") to mean high water springs at high tide ("MHWS") at Eastney beach in Portsmouth;
- Jointing of the HVDC marine cables and HVDC onshore cables at the landfall;
- Two optical regeneration station buildings (for fibre-optic cable signal amplification) and their compounds at the landfall, with associated landscape planting;
- The onshore interconnector cable consisting of two HVDC circuits from mean low water ("MLWS") at Eastney beach to the converter station at Lovedean, including joint bays and link boxes or link pillars;
- The converter station area at Lovedean, including the converter station and associated equipment, construction works compounds and laydown areas, a new 1.2 km access road, surface water attenuation ponds, new landscape planting and other associated infrastructure;
- An extension to the existing Lovedean Substation, High Voltage Alternating Current ("HVAC") cables and associated infrastructure connecting the converter station to the National Electricity Transmission System at Lovedean Substation;
- Fibre-optic cables installed together with each of the HVDC and HVAC circuits and associated infrastructure; and
- Various temporary construction and access works.

The total length of the interconnector cable route would be approximately 238 km in length in the UK and France. The principle onshore built works in the UK are in a rural setting approximately 800 m to the north-west of the village of Lovedean, near Waterlooville in Hampshire, outside of the southern fringes of the South Downs National Park. The site lies immediately west of National Grid Electricity Transmission plc's existing Lovedean Substation, the proposed point of connection to the National Electricity Transmission System. The offshore and onshore cable route is shown in Figure 1 and Figure 2.

Rural, largely single-lane roads form a boundary to the substation and the wider block of farmland which includes the proposed converter station site. The nearest residential dwellings are approximately 250 m from the site. The proposed route for the interconnector cable then runs southwards to Eastney on Portsea Island. It crosses farmland for the first part of the route, approximately 2.5 km, and then largely follows the highway network and some open spaces from west of Waterlooville to Eastney. The route continues from the shoreline across the English Channel south-eastwards to the edge of the UK EEZ. Beyond this, the proposed interconnector route continues to Le Havre in France and into the Normandy countryside.

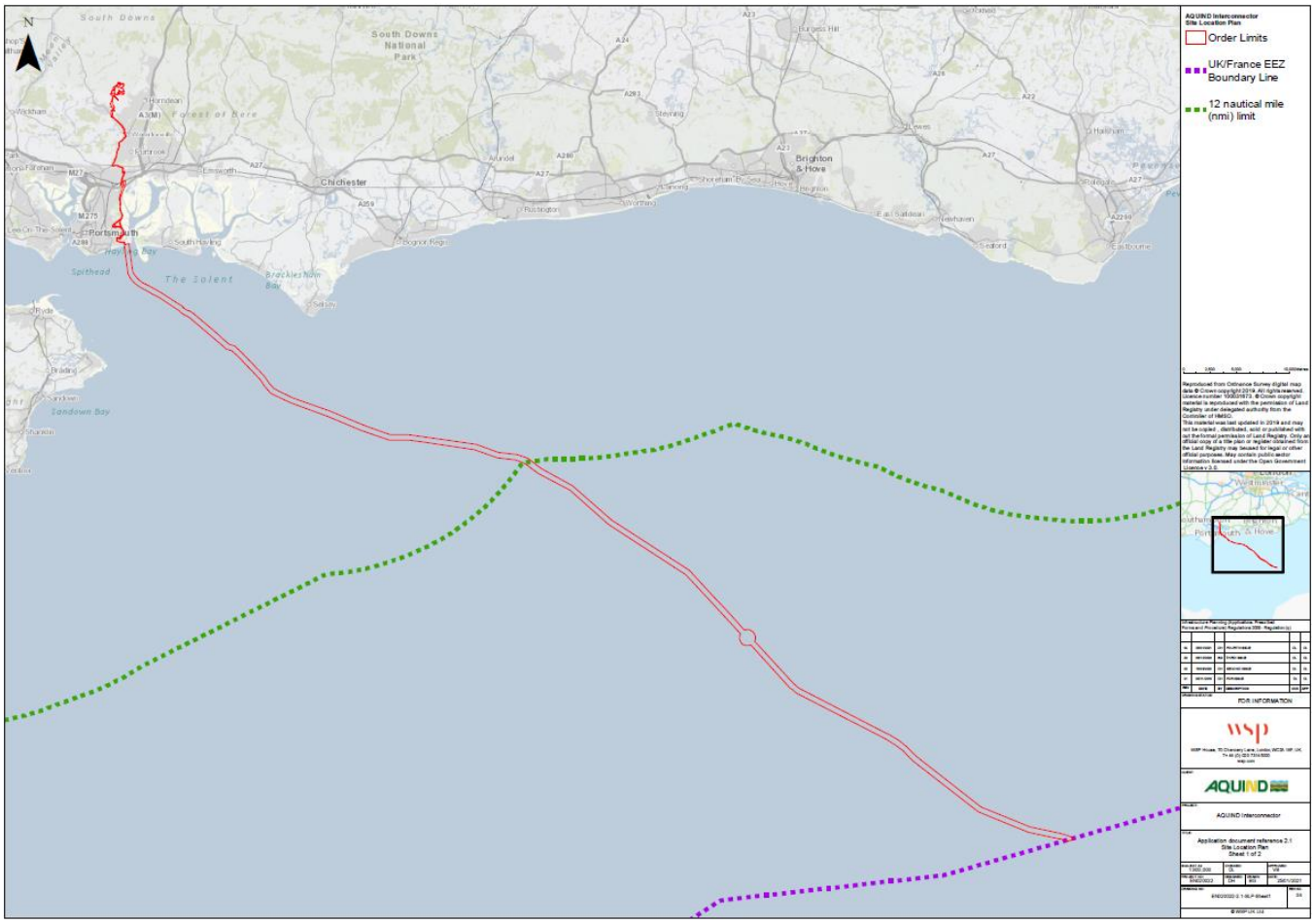

Figure 1: Proposed location of the Project

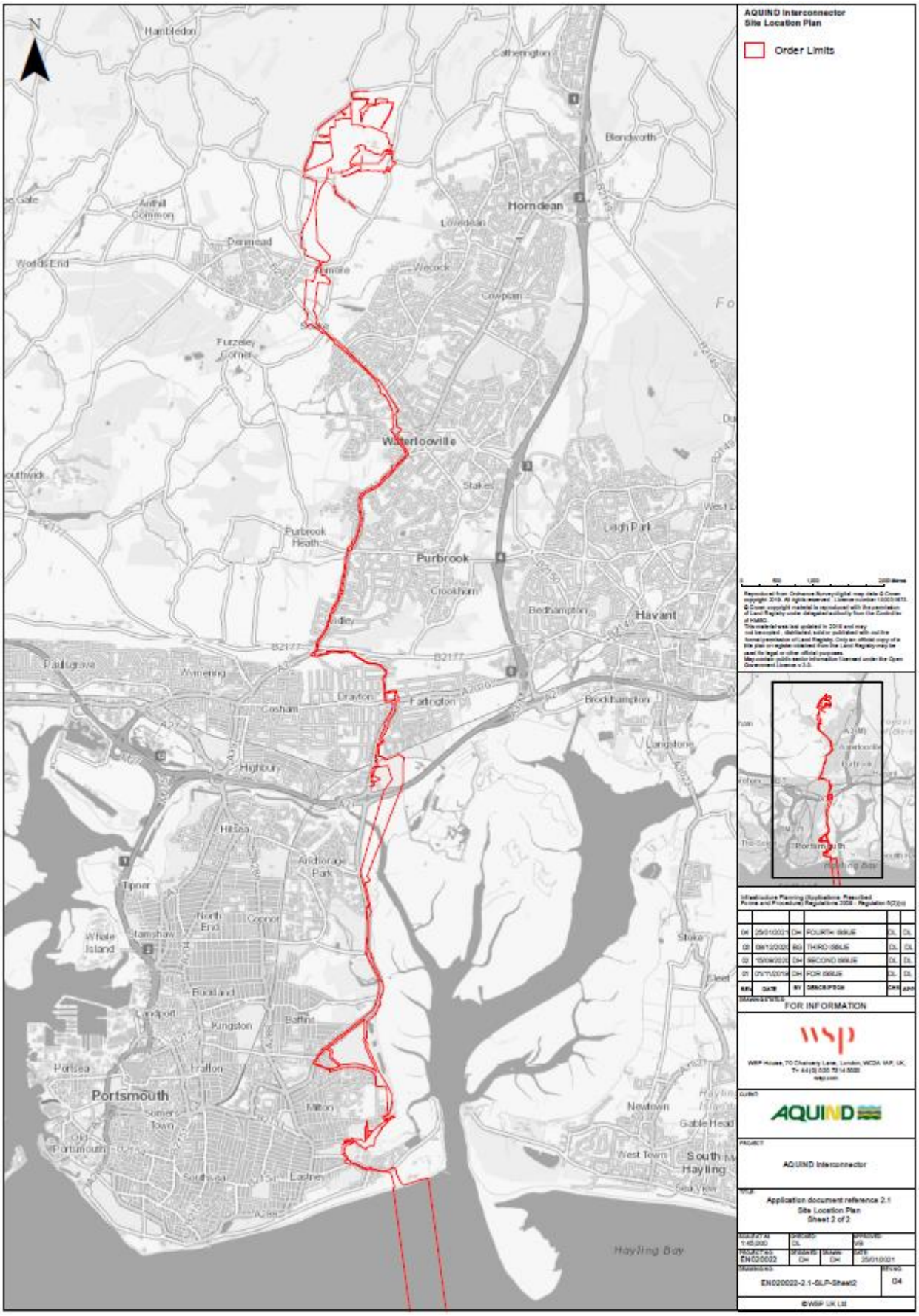

Figure 2: Proposed location of the Project (onshore)

The Order limits encompass a range of land use types, and lengths of horizontal directional drilling ("HDD") would pass under some key constraints. Between Lovedean and Waterlooville, the proposed cable route crosses a predominantly rural area consisting of agricultural land and villages. To Portsdown, the route passes through a largely urban environment of residential and commercial land uses that fringe the western edges of Waterlooville and Purbrook. At Portsdown, the route crosses the ridge via a roadside car parking area then continues south and passes through largely residential areas in Farlington. Here, commercial areas and playing fields are utilised to drill sections under the mainline railway, the A27 trunk road, Farlington Marshes and Langstone Harbour, to emerge near the north-eastern corner of Portsea Island.

Portsea Island is a dense urban area, with residential, commercial and industrial development. To reach Eastney, the route uses roads, recreational spaces, common land, allotments and a University of Portsmouth campus. An informal car park near to Fort Cumberland in Eastney provides the proposed landfall location and site for the optical regeneration station buildings. A holiday park is situated immediately south, beyond which is Eastney beach.

In the marine environment, the proposed cable route heads from Eastney beach south-eastwards across the English Channel to the outer limit of the UK EEZ, crossing the eastern Solent, with the Nab Channel to the west.

2.1. Changes to the Project

Three onshore change requests were made during the course of the Examination (two material, one non-material), these included requests for additional land within the Order limits and matters related to Compulsory Acquisition. The implications of the changes to the Applicant's HRA findings, both alone and in-combination, were considered by the ExA before being accepted. They were found to not have any implications for the outcome of the assessment.

The design of the Project was amended in January 2021 to facilitate an additional marine cable crossing. The proponents of 'CrossChannel Fibre', a proposed fibre-optic cable development extending from Brighton to France, submitted a marine licence application to the Marine Management Organisation ("MMO") in January 2021 with a view to start construction in September 2021. The HRA Report was updated to address the design change, though the overall conclusions of the assessment in relation to protected sites did not change.

3. Likely Significant Effects Test

Under regulation 63 of the Habitats Regulations and regulation 28 of the Offshore Habitats Regulations, the Secretary of State must consider whether a project will have a LSE, either alone or in-combination with other plans or projects on each of the interest features of the protected sites identified in the RIES.

The purpose of this section is to identify any LSEs on protected sites and to record the Secretary of State's conclusions on the need for an AA and his reasons for including activities, sites or plans and projects for further consideration in the AA.

Of all the protected sites identified during Examination, the ExA concluded that likely significant effects could not be excluded for the following 13 sites and their qualifying features, either alone or in-combination, based on the final version of the Applicant's HRA Report [REP8-020].

- Solent and Dorset Coast SPA
- Chichester and Langstone Harbours SPA
- Chichester and Langstone Harbours Ramsar site
- Portsmouth Harbour SPA
- Portsmouth Harbour Ramsar site
- Solent and Southampton Water SPA
- Pagham Harbour SPA
- River Itchen SAC
- River Avon SAC
- River Axe SAC
- Plymouth Sound and Estuaries SAC
- Solent Maritime SAC
- South Wight Maritime SAC

No additional sites which could be affected by the Project were identified by any of the Interested Parties. However, some Interested Parties disputed the conclusions of the Applicant's initial assessment of LSE.

Table 1: Protected sites for which LSE cannot be excluded, when the Project is considered alone or in combination with other plans or projects, on the listed qualifying features (summarised from ExA Report [ExA: Table 8.1] and the final HRA Report [REP8-020]). summarises the features for which significant effects, either alone or in-combination, cannot be excluded for each site. The RIES and the Applicant's final HRA Report provide further information on sites and features which were considered, but for which LSE were screened out.

In relation to the Portsmouth Harbour SPA, the Applicant's original HRA Report identified LSE only for the red-breasted merganser (*Mergus serrator*) and not for any of the other species of the site which are also qualifying features. NE advised ([RR-181] and [REP1-216]) that the onshore cable runs through areas which have been identified as supporting habitat that forms part of a network joining Portsmouth Harbour to Langstone Harbour. It would therefore be used by species which are qualifying features of both Portsmouth Harbour SPA and Chichester and Langstone Harbours SPA. The potential therefore exists for LSE on other qualifying features of the Portsmouth Harbour SPA. The Applicant provided a revised HRA Report which included an updated assessment of LSE based on NE's advice.

The HRA Report originally excluded LSE from visual disturbance during onshore construction works for the bird features of the Chichester and Langstone Harbours SPA and Ramsar site. NE advised that visual disturbance immediately adjacent to the SPA boundary would qualify as a LSE if works were proposed during the over-wintering period [REP1-216]. The Applicant updated its HRA Report to include visual disturbance on the SPA features whilst maintaining its position that the birds would not be affected by visual disturbance in an industrialised environment.

NE [RR-181] and Portsmouth City Council [RR-185] queried the scope of the onshore ecology in-combination assessment. This was in relation to potential effects on functionally linked land used by bird species which are qualifying features of the Chichester and Langstone Harbours SPA and Ramsar site and Portsmouth Harbour SPA and Ramsar site, particularly dark-bellied brent geese. The following projects were identified for inclusion in the in-combination assessment:

- 19/01368/FUL Flood and Coastal Erosion Management Scheme - North Portsea Island Phase 4B Coastline Between Milton Common and Kendall's Wharf, Eastern Road, Portsmouth; and
- 19/00420/FUL Fraser Range Fort Cumberland, Southsea.

In response, the Applicant provided a revised HRA Report which included the Flood and Coastal Erosion Management Scheme – North Portsea Island Phase 4B ("FCEMS Phase 4B"). The Applicant advised that the Fraser Range Port development application was addressed in ES Appendix 16.15 [APP-423].

Portsmouth City Council advised that mitigation measures had been proposed as part of the North Portsea Island FCEMS Phase 4B on Milton Common to avoid adverse effects on the integrity of the Solent SPAs, the Chichester and Langstone Harbours SPA in particular. It was concerned that the effectiveness of these measures would be affected by the Project [REP1-174]. The Applicant noted that the North Portsea Island FCEMS Phase 4B had revised its proposed mitigation and would no longer be using mitigation areas on Milton Common. However, Portsmouth City Council remained concerned about the in-combination disturbance effects ([REP1-175], [REP4-009], [REP6-043] and [REP6-083]).

Following updates to the HRA Report, NE agreed that the North Portsea Island FCEMS Phase 4B had been treated appropriately. NE also agreed that the Fraser Range application had been treated appropriately in Chapter 29 of the ES ([REP4-015] and [REP6-045]). During Examination, NE stated that it has become aware that a bird refuge for dark-bellied brent geese had been established on Milton Common. It advised this should be recognised in the HRA Report and measures taken to avoid impacts. NE recommended that the Applicant should mitigate effects on the bird refuge area in the same way as it would for known Solent Waders and Brent Goose Strategy sites ("SWBGS"). NE also advised that a further area may come forward in relation to another planning application and that this second area should also be taken into account to avoid delays in the planning process.

The Joint Nature Conservation Committee ("JNCC") confirmed it agreed with the Applicant's conclusions on LSE [REP8-032]. NE confirmed that apart from the dispute about visual disturbance leading to LSE on the Chichester and Langstone Harbours SPA, it agreed with the Applicant's conclusions in relation to LSE ([REP8-031] and [REP8-032]).

Table 1: Protected sites for which LSE cannot be excluded, when the Project is considered alone or in combination with other plans or projects, on the listed qualifying features (summarised from ExA Report [ExA: Table 8.1] and the final HRA Report [REP8-020]).

Name of protected site	Qualifying features	Effects
Solent and Dorset Coast SPA	Little tern *Sternula albifrons*	*For all phases of the Project:* Disturbance and displacement from preferred foraging habitat within the SPA from noise or visual disturbance from the presence of vessels and associated activities. Increases in suspended sediment concentrations ("SSC") as a result of construction activities affecting the seabed and cable maintenance could affect prey availability.

Name of protected site	Qualifying features	Effects
		Accidental oil or chemical spillages from activities in the marine and terrestrial environment. Accidental release of litter in the marine or terrestrial environment causing bird mortality through entanglement or ingestion.
	Sandwich tern *Sterna sandvicensis* Common tern *Sterna hirundo*	*For all phases of the Project:* Increases in SSC as a result of activities affecting the seabed and cable maintenance could affect prey availability. Accidental oil or chemical spillages from activities in the marine or terrestrial environment. Accidental release of litter into the marine or terrestrial environment causing bird mortality through entanglement or ingestion.
Chichester and Langstone Harbours SPA	Red-breasted merganser Little tern	As for the little tern feature of Solent and Dorset Coast SPA.
	Sandwich tern Common tern	As for the Sandwich tern and common tern features of the Solent and Dorset Coast SPA.
	Dark-bellied brent goose *Branta bernicla* Shelduck *Tadorna tadorna* Shoveler *Anas clypeata* Wigeon *Anas Penelope* Pintail *Anas acuta* Teal *Anas crecca* Grey plover *Pluvialis squatarola* Curlew *Numenius arquata* Bar-tailed godwit *Limosa lapponica* Common redshank *Tringa totanus* Waterbird assemblage	Disturbance and displacement from noise or visual disturbance caused by construction and decommissioning onshore activities. Accidental release of litter into the intertidal or terrestrial environment leading to bird mortality for all phases of the Project. Accidental oil or chemical spillages from activities in the marine or terrestrial environment.
	Turnstone *Arenaria interpres* Ringed plover *Charadrius hiaticula* Sanderling *Calidris alba* Dunlin *Calidris alpina*	Accidental release of litter into the intertidal or terrestrial environment leading to bird mortality for all phases of the Project. Accidental oil or chemical spillages from activities in the marine or terrestrial environment.
Chichester and Langstone Harbours Ramsar site	Dark-bellied brent goose Shelduck Common redshank Grey plover Black-tailed godwit *Limosa limosa*	As for dark-bellied brent goose feature of the Chichester and Langstone Harbours SPA.
	Ringed plover Dunlin	As for the ringed plover and dunlin features of the Chichester and Langstone Harbours SPA.

Name of protected site	Qualifying features	Effects
	Little tern	As for the little tern feature of Solent and Dorset Coast SPA.
Portsmouth Harbour SPA	Red-breasted merganser	Accidental oil or chemical spillages from vessels causing bird mortality through direct oiling of birds or through effects on prey availability. Accidental release of litter into the marine environment causing bird mortality through entanglement or ingestion.
	Dark-bellied brent goose	As for dark-bellied brent goose feature of the Chichester and Langstone Harbours SPA.
	Black-tailed godwit Dunlin	As for the turnstone feature of the Chichester and Langstone Harbours SPA.
Portsmouth Harbour Ramsar site	Dark-bellied brent goose	As for dark-bellied brent goose feature of the Chichester and Langstone Harbours SPA.
Solent and Southampton Water SPA	Mediterranean gull *Ichthyaetus melanocephalus* Sandwich tern Little tern Roseate tern *Sterna dougallii* Common tern	Accidental oil or chemical spillages from vessels causing bird mortality through direct oiling of birds or through effects on prey availability. Accidental release of litter into the marine environment causing bird mortality through entanglement or ingestion.
Pagham Harbour SPA	Common tern	Accidental oil or chemical spillages from vessels causing bird mortality through direct oiling of birds or through effects on prey availability. Accidental release of litter into the marine environment causing bird mortality through entanglement or ingestion.
River Itchen SAC	Atlantic salmon *Salmo salar*	During construction and decommissioning there could be an increase in SSC as a result of activities such as dredge and disposal. This could act as a barrier to fish following migratory routes around the coast or affect fish directly through oxygen depletion. Pollution events as a result of accidental releases of substances such as pesticides, anti-foulants or bentonite from vessels during construction, operation and decommissioning activities.
River Avon SAC	Sea lamprey *Petromyzon marinus* Atlantic salmon	As for Atlantic salmon feature of the River Itchen SAC.
River Axe SAC	Sea lamprey	Pollution events as a result of accidental releases of substances such as pesticides, anti-foulants or bentonite from vessels during construction, operation and decommissioning activities.

Name of protected site	Qualifying features	Effects
Plymouth Sound and Estuaries SAC	Allis shad *Alosa alosa*	As for sea lamprey feature of the River Axe SAC.
Solent Maritime SAC	Estuaries Mudflats and sandflats not submerged at low tide Sandbanks slightly covered by seawater all the time *Spartina* swards *Salicornia* and other annuals colonising mud	Increases in SSC during cable installation or repair and maintenance. Sediment deposition during cable installation or repair and maintenance leading to smothering of habitats. For all phases of the Project, accidental releases of marine litter or discharges of oil and other substances could affect the qualifying features, for example through the smothering of habitats, leaching or contamination from chemicals. Invasive non-native species ("INNS") could be introduced either directly (for example through discharges of ballast water) or through creating new hard substrate which could influence the introduction and spread of INNS.
South Wight Maritime SAC	Reefs Submerged or partially agreed sea caves	As for the Solent Maritime SAC.

The ExA was satisfied that the Applicant's final HRA Report identified all the LSE that could result from the Project alone or in-combination with other plans or projects.

The Secretary of State has considered the potential effects of the Application on all relevant qualifying features of the 13 protected sites listed above, with consideration of their conservation objectives, to determine whether there will be LSEs in the context of the Habitats Regulations and the Offshore Habitats Regulations. The Secretary of State recognises that powers are in place for decommissioning effects to be addressed fully by the relevant authorities prior to decommissioning and with consideration of more detailed information on decommissioning processes and environmental conditions at that time. The Secretary of State therefore considers that it is reasonable not to include a detailed discussion on decommissioning effects in this report and notes that decommissioning is not a barrier to the Application being granted.

3.1. Likely Significant Effects Alone Assessment

The Secretary of State agrees with the recommendations of the ExA and concludes that LSEs cannot be excluded at the 13 sites listed in Table 1: Protected sites for which LSE cannot be excluded, when the Project is considered alone or in combination with other plans or projects, on the listed qualifying features (summarised from ExA Report [ExA: Table 8.1] and the final HRA Report [REP8-020])., when the Project is considered alone.

These sites are taken forward to the AA to consider whether the Project will result in an adverse effect upon the integrity of these sites.

3.2. Likely Significant Effects In-Combination Assessment

Under the Habitats Regulations and the Offshore Habitat Regulations, the Secretary of State is obliged to consider whether other plans or projects in-combination with the Project might affect protected sites. In this case there are several other plans or projects which could potentially affect some of the same protected sites.

The approach used by the Applicant to assess in-combination effects was to select plans or projects which may affect the designated site feature under consideration. The plans or projects included in the in-combination assessment spanned both UK and French jurisdictions and were listed in Appendix 3 to the Applicant's HRA Report [REP1-086]. Several planned and existing offshore wind farms within the vicinity of the Project were included in the assessment, as well as a number of projects expected to affect coastal, marine and terrestrial habitats, for example works to extract aggregates, cable maintenance or construction of coastal defences.

The Secretary of State agrees with the recommendations of the ExA and concludes that LSEs cannot be excluded at the same 13 sites identified in the LSE alone assessment, listed in Table 1, when the impacts of the Project are considered in-combination with other plans or projects.

The 13 sites listed in Table 1 are taken forward to the AA to consider whether the Project in-combination with other plans or projects will result in an adverse effect upon the integrity of these sites.

4. Appropriate Assessment Methodology

The requirement to undertake an AA is triggered when a competent authority, in this case the Secretary of State, determines that a plan or project is likely to have a significant effect on a protected site either alone or in-combination with other plans or projects. Guidance issued by Defra states that the purpose of an AA is to assess the implications of the plan or project in respect of the site's conservation objectives, either individually or in-combination with other plans and projects, and that the conclusions should enable the competent authority to ascertain whether the plan or project will adversely affect the integrity of the site concerned. The focus is therefore specifically on the species and/or habitats for which the protected site is designated[4].

The purpose of this AA is to determine whether the adverse effects on the integrity of the features of the 13 sites identified can be ruled out as a result of the Application alone or in-combination with other plans and projects in view of the site's conservation objectives and using the best scientific evidence available.

If the competent authority cannot ascertain the absence of an adverse effect on integrity with reasonable scientific doubt, then under the Habitats Regulations, alternative solutions should be sought. In the absence of an acceptable alternative, the project can proceed only if there are imperative reasons of overriding public interest ("IROPI") and suitable compensation measures are identified.

4.1. Conservation Objectives

Defra Guidance indicates that disturbance to a species or deterioration of a protected site must be considered in relation to the integrity of that site and its conservation objectives[5]. It states that "*the integrity of a site is the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was designated*".

The Habitats Regulations and the Offshore Habitats Regulations are pieces of domestic law that transposed the land and marine aspects of the Habitats Directive (Council Directive 92/43/EEC) and certain elements of the Birds Directive (Directive 2009/147/EC). As required by the Directives, 'conservation objectives have been established by Natural England. When met, each site will contribute to the overall favourable conservation status of the species or habitat feature across its natural range. Conservation objectives outline the desired state for a protected site, in terms of the interest features for which it has been designated. If these interest features are being managed in a way which maintains their nature conservation value, they are assessed as being in a 'favourable condition'. An adverse effect on integrity is likely to be one which prevents the site from making the same contribution to favourable conservation status for the relevant feature as it did at the time of its designation. There are no set thresholds at which impacts on site integrity are considered adverse. This is a matter for interpretation on a site-by-site basis, depending on the designated feature and nature, scale, and significance of the impact.

Natural England has issued generic conservation objectives, which should be applied to each interest feature of the site. Supplementary advice for each site underpins these generic objectives to provide site-specific information and give greater clarity to what might constitute an adverse effect on a site interest feature. Supplementary advice on conservation objectives is subject to availability and is currently being updated on a rolling basis.

[4] https://www.gov.uk/guidance/appropriate-assessment#what-must-an-appropriate-assessment-contain

[5] https://www.gov.uk/guidance/appropriate-assessment#what-must-an-appropriate-assessment-contain

Where supplementary advice is not yet available for a site, Natural England advises that HRAs should use the generic objectives and apply them to the site-specific situation. For SPAs, the overarching objective is to avoid the deterioration of the habitats of qualifying features, and the significant disturbance of the qualifying features, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving the aims of the Birds Directive. This is achieved by, subject to natural change, maintaining and restoring:

- The extent and distribution of the habitats of the qualifying features.
- The structure and function of the habitats of the qualifying features.
- The supporting processes on which the habitats of the qualifying features rely.
- The populations of the qualifying features.
- The distribution of the qualifying features within the site.

For SACs, the overarching objective is to avoid the deterioration of the qualifying natural habitats and the habitats of qualifying species, and the significant disturbance of those qualifying species, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving favourable conservation status of each of the qualifying features. This is achieved by, subject to natural change, maintaining and restoring:

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

Following a request under Rule 17 of the Infrastructure Planning (Examination Procedure) Rules 2010 (Request for Further Information) from the ExA and discussions with NE, the Applicant submitted information about the Conservation Objectives and Supplementary Advice on the Conservation Objectives for the UK protected sites (where available) in the document, HRA Report: Appendix 6 UK Sites Conservation Objectives and Supplementary Advice Attributes [REP6-058].

The conservation objectives and, where available, supplementary advice on conservation objectives have been used by the Secretary of State to consider whether the Project has the potential to have an adverse effect on the integrity of sites, either alone or in-combination with other plans or projects. The potential for the Project to have an adverse effect on site integrity is considered for each site in turn.

4.2. In-Combination Assessment Methodology

The HRA Report referenced PINS Advice Note Ten: Habitats Regulations Assessment (version 8, November 2017) in its approach to the assessment of in-combination impacts. The advice notes that the following projects and plans should be considered:

- Projects that are under construction;
- Permitted applications(s) not yet implemented;
- Submitted application(s) not yet determined;
- All refusals subject to appeal procedures not yet determined;
- Projects on the National Infrastructure's programme of projects; and
- Projects identified in the relevant development plan (and emerging development plans – with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposals will be limited and the degree of uncertainty which may be present.

In the context of the Project, the HRA Report adopted a three-tiered approach to encompass the projects and plans listed above:

- Tier 1: The Project considered alongside other project/plans currently under construction and/or those consented but not yet implemented, and/or those submitted but not yet determined and/or those currently operational that were not operational when baseline data was collected, and/or those that are operational but have an ongoing effect;
- Tier 2: Projects/plans on the National Infrastructure Programme of Projects where a Scoping Report has been submitted; and
- Tier 3: Project/plans on the PINS Programme of Project where a Scoping Report has not been submitted; (where appropriate) projects identified in the relevant Development Plan (and emerging Development Plans with appropriate weight being given as they move closer to adoption), and projects identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward[6].

A list of all plans and projects which were considered in the Applicant's in-combination assessment are provided in the HRA Report – Volume 3 – Appendix 3: In Combination Projects [REP1-086]. Further details of the screening and integrity matrices considered within the assessment are provided in the HRA Report – Volume 3 – Appendix 1: PINS Screening and Integrity Matrices [REP8-022].

[6] PINS (2015). Advice note 17: Cumulative effects Assessment. Available from: https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf

5. Appropriate Assessment

5.1. Appropriate Assessment: Solent and Dorset Coast SPA

The Solent and Dorset Coast SPA covers 88,980.55 ha and wholly occupies the Solent. The seaward boundary of the site consists of three arcs running from east to west. The furthermost extremes of these arcs lie at approximately 5 km, 12 km and 12 km from the nearest points of the mainland shore. The landward boundary is located on the coasts of Dorset, Hampshire, Isle of Wight and West Sussex. The extremities of the site running west to east have been determined by the modelled usage of foraging Sandwich terns from adjacent SPAs: Chichester and Langstone Harbours SPA, Poole Harbour SPA, and Solent and Southampton Water SPA. The Project passes through the site from the landfall at Eastney out to approximately Kilometre Point ("KP") 16 of the marine cable corridor.

The site qualifies under article 4 of the Birds Directive (2009/147/EC) by regularly supporting more than 1% of the British breeding populations of three species listed in Annex I of the Birds Directive: Sandwich tern (4.01%), common tern (4.77%) and little tern (3.31%)[7].

Site-specific supplementary advice on conservation objectives was not available for the Solent and Dorset Coast SPA at the time of the HRA Report's assessment.

During Examination, Natural England requested that potential LSE on supporting habitat (water column) was also considered in addition to the ornithological features of the site [APP-025] and [APP-504].

5.1.1. Little tern: Alone and in-combination

5.1.1.1. Disturbance and displacement

The Applicant assessed HDD works and associated presence of vessels during all phases of development for the potential to displace little tern from foraging habitat through visual disturbance and unprecedented noise events.

The closest onshore HDD location (Kendell's Wharf) is situated 2 km from the Bakers Island little tern colony. The Applicant highlighted that works would take place in an industrialised setting and vibro-hammering during construction would be short in duration. Noise levels during construction would be ~40 decibels ("dB") at Baker's Island, and along with visual disturbance, was determined to not be noticeable above baseline levels. At the marine HDD location, noise generated by vibro-hammers would be short in duration, and along with pile-driving, would be non-percussive. Airbourne sound pressure levels ("SPL") and underwater noise exposure was not anticipated to be discernible above baseline levels. The Applicant noted other unaffected foraging sites were available in the vicinity if little tern were disturbed.

The Applicant determined that as the majority of the 827 vessel movements anticipated during the construction period would be outside of the 10 km foraging range of little tern[8] and against a baseline of 300-400 daily transitioning vessels in the Channel and Solent, this was not expected to cause disturbance.

[7] http://publications.naturalengland.org.uk/publication/5294923917033472

[8] Parsons, M., Lawson, J., Lewis, M., Lawrence, R. & Kuepfer, A. (2015) Quantifying foraging areas of little tern around its breeding colony SPA during chick-rearing. JNCC Report No. 548. Joint Nature Conservation Committee, Peterborough.

The potential for disturbance during operation was considered to be less than during construction as the worst-case failure rate of marine cable repair is once every 10-12 years. These would be carried out by a single vessel in a short timeframe (weeks to months).

The plans or projects which have spatial or temporal overlap with the Project are outlined in the HRA Report – Volume 3 – Appendix 3: In Combination Projects [REP1-086]. The Applicant considered the potential for in-combination disturbance and displacement impacts to be highly localised and temporary.

5.1.2. All features: Alone and in-combination

5.1.2.1. Indirect effects

Seabed disturbance, increased suspended sediment concentrations ("SSC") and associated increased turbidity have the potential to displace prey species of tern and interfere with foraging.

Under the worst-case scenario for sediment deposition from disposal of dredged material and increased SSC, the spatial extent of the sediment plume was 25 km. The ES design envelope includes the requirement for the disposal of dredge material (potentially required as a result of sandwave clearance), within the proposed disposal area which is located within the marine cable corridor between KP21 and KP109. Disposal in the nearshore area will be prohibited (KP0 – KP21).

Entry/exit points of HDD will be onshore, therefore the volume of suspended material within Langstone Harbour is expected to be negligible. Excavation at the marine HDD pits (KP1 – KP1.6) and cable installation (between KP5 – KP15) was predicted to transport fine sediments up to 10 km from the release point. Natural variation in SSC ranges from <5 to 75 mg/L in coastal areas, as such, changes in SSC resulting from the Project (<5 mg/L) would not be discernible.

The area of disturbed habitat within the marine cable corridor was determined to be a maximum of 3.6 km^2. Densities of breeding terns are not expected to be high where sediment disposal will be located, beyond KP21[9] [10]. Where tern densities are likely to be higher in the nearshore, a peak of up to 200 mg/L may be observed within 2 km of the cable trench/HDD pit, which could persist for several hours following completion of works. Sediment plume modelling shows that sediment could be transported up to 5 km from the cable trench/HDD pit where concentrations of 5 – 10 mg/L are predicted. SSC concentrations are expected to return to normal levels after several days.

Cable repair works were considered to have a lower potential for increased SSC than construction, as the works would be shorter in duration and more localised. The Applicant highlighted that most prey species of tern can tolerate a degree of suspended sediment in the water column owing to frequent exposure to storm induced fluctuations in sediment concentrations and high background levels of suspended sediment in the Solent[11].

The Applicant anticipated impacts alone and in-combination to be to be temporary and localised.

5.1.2.2. Accidental spills and litter

Unplanned oil or chemical spills from vessels and unplanned disposal of marine litter have the potential to result in mortality and sublethal effects on tern species and their supporting habitat, impacting the birds

[9] Thaxter, C., Lascelles, B., Sugar, K., Cook, A., Roos, S., Bolton, M., Langston, R. and Burton, N. (2012) Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. *Biological Conservation*, 156, 53-61.

[10] Wilson, S.L., Black, J., Brewer, M.J., Potts, J.M., Kuepfer, A., Win, I., Kober, K., Bingham, C., Mavor, R. and Webb, A. (2014). Quantifying usage of the marine environment by terns Sterna sp. around their breeding colony SPAs. Peterborough: JNCC.

[11] Guillou N., Rivier A., Chapalain G., Gohin F. (2017). The impact of tides and waves on near-surface suspended sediment concentrations in the English Channel. *Oceanologia,* 59, pp. 28—36.

and their prey through direct oiling or through ingestion or entanglement. The Applicant stated that standard best practice in terms of waste management and spill response procedures for offshore working will be adhered to. These are described in the Outline Marine Construction Environmental Management Plan ("CEMP") [APP-488] which will be secured through the dML as part of the Recommended DCO. This will include the following measures that will reduce the likelihood of pollution events to as low as is reasonably practicable:

- Adoption of routine measures and standard best practice in terms of waste management, auditing, pollution prevention measures and implementation of a dropped object protocol;
- All vessels will also adhere to MARPOL requirements, managed under the International Safety Management ('ISM') Code, which provides an International standard for the safe management and operation of ships for pollution prevention;
- Oil and fuel shall be stored securely in bunded containers. Chemicals will be stored securely, and good housekeeping practices must be adhered to always;
- The process of refuelling or bunkering shall be managed to ensure that the risk of pollution is minimised with details as to how this will be implemented provided in the method statement for each work phase; and
- A Marine Pollution Contingency Plan, required as part of the dML, will be developed and approved post-consent. This plan will set out the measures to be in place to minimise the risks of pollution incidents as well as the procedures to be followed if a pollution incident did occur. This will include the key roles and their responsibilities and relevant contact details.

The Applicant concluded that in-combination impacts would not result in adverse effects given the scale and nature of other plans and projects included in the assessment and their requirement to adhere to similar best practice measures.

5.1.3. Conclusions

The Applicant concluded there would be no adverse effect on integrity ("AEoI") alone or in-combination on the Solent and Dorset Coast SPA resulting from the Project. This conclusion was not disputed by any Interested Party. NE stated in its RR that an AEoI on the site resulting from the Project could be excluded beyond reasonable scientific doubt [RR-181]. This was agreed and finalised in its final SoCG [REP8-031]. The Secretary of State agrees with this conclusion.

5.2. Appropriate Assessment: Chichester and Langstone Harbours SPA and Ramsar site

Chichester and Langstone Harbours SPA covers 5,810.95 ha and is comprised of two large, estuarine basins and together with Portsmouth Harbour, forms one of the most important sheltered intertidal areas on the south coast of England. The Project passes through the site and then borders the site further along the cable route.

The sites regularly support more than 10,000 wintering wildfowl and more than 20,000 wintering waders. The site also supports internationally important numbers of the following species: grey plover (3.9% of the west European population), sanderling (3.1% of the west European population), dunlin (2.6% of the west European population), redshank (1.4% of the west European population), brent goose (12% of the west European population), shelduck (4% of the west European population), and teal (1% of the west European population).

The SPA qualifies under article 4.2 of the Birds Directive (79/409/EEC) by supporting internationally important numbers of migratory bird species listed above and nationally important wintering numbers of the following migratory species: ringed plover, curlew, bar-tailed godwit, turnstone, wigeon, pintail, shoveler and red-breasted merganser. The SPA also qualifies under article 4.1 of the Birds Directive

(79/409/EEC) as it regularly supports the following species during the breeding season: little tern, common tern and sandwich tern[12].

Site-specific supplementary advice on conservation objectives was available for the Chichester and Langstone Harbours SPA. Table 2 lists attributes which were considered to be equivalent to those impacts for which a LSE could not be excluded.

Table 2: Supplementary advice attributes assessed for the Chichester and Langstone Harbours SPA.

Feature	Impact for which LSE could not be excluded	Equivalent supplementary advice attribute
Red-breasted merganser	Disturbance and displacement	Disturbance caused by human activity
		Non-breeding population: abundance
Little tern	Disturbance and displacement	Disturbance caused by human activity
Red-breasted merganser Little tern Sandwich tern Common tern	Indirect effects	Supporting habitat: food availability
		Supporting habitat: water quality – turbidity
	Accidental spills and litter	Supporting habitat: water quality – contaminants
Dark-bellied brent goose Redshank Shelduck Pintail Shoveler Teal Wigeon Bar-tailed godwit Black-tailed godwit Curlew Waterfowl assemblage	Disturbance and displacement	Disturbance caused by human activity
Little tern Sandwich tern Common tern Dark-bellied brent goose Redshank Shelduck Pintail Shoveler Teal Widgeon Bar-tailed godwit Black-tailed godwit Curlew Turnstone Sanderling Grey plover Ringed plover Dunlin	Accidental spills and litter	Supporting habitat: food availability

[12] http://publications.naturalengland.org.uk/publication/5789102905491456

Waterfowl assemblage	Accidental spills and litter	Supporting habitat: quality of supporting non-breeding habitat

The Chichester and Langstone Harbours Ramsar site covers 5,749 ha and qualifies under Ramsar criterion 1 for its two large estuarine basins linked by the channel which divides Hayling Island from the main Hampshire coastline. The site includes saltmarsh, intertidal mudflats, sand and shingle spits and sand dunes.

Through supporting waterfowl assemblages of international importance, the site qualifies under Ramsar criterion 5. The site also qualifies under Ramsar criterion 6 for supporting populations of ringed plover, black-tailed godwit, common redshank, dark-belled brent goose, shelduck, grey plover and dunlin[13].

During Examination, Natural England requested that potential LSE on supporting habitat (water column, and freshwater and grazing marsh) was also considered in addition to the marine and onshore ornithological features of the site [APP-025] and [APP-504].

5.2.1. Red-breasted merganser, little tern, Sandwich tern, common tern and supporting habitat: Alone and in-combination

5.2.1.1. Disturbance and displacement

No impact pathway from disturbance and displacement was identified for Sandwich tern, common tern or their supporting habitat at the LSE stage. As red-breasted merganser and little tern are considered moderately sensitive to disturbance and displacement, potential effects were assessed for all phases of the Project[14] [15] [16].

The closest onshore HDD location at Kendall's Wharf is approximately 1 km from the roosting areas of red-breasted merganser, east of Farlington Marshes, and approximately 2 km from the little tern colony at Baker's Island. The Applicant highlighted that works at the HDD location would be taking place in an industrialised setting and vibro-hammering would be short in duration (two hours). Noise levels from the Excavator Mounted Vibrator are anticipated to be <50 dB at Farlington Marshes and approximately 40 dB at Baker's Island. Noise and visual disturbance at the HDD location during construction is not anticipated to be noticeable above baseline levels within Langstone Harbour. It was noted that other equivalent foraging sites for little tern are present elsewhere in the harbours.

Red-breaster merganser are expected to be present in nearshore waters throughout the Solent, and little tern at the mouth of Langstone Harbour. The potential for both species to be disturbed by unprecedented noise activities associated with marine HDD works was assessed. At the marine HDD location off Eastney, vibro-hammering would be short in duration, and along with the pipe-driving machine, will be non-percussive. Airbourne SPLs are not expected to be noticeable above baseline levels. Exposure of little tern to underwater noise was determined to be minimal as they dive to a maximum of 1 m whilst feeding. Red-breasted merganser dive to depths of <10 m[17], however, noise levels are not predicted to

[13] https://rsis.ramsar.org/ris/378

[14] Bradbury, G., Trinder, M., Furness, B., Banks A.N., Caldow R.W.G. (2014) Mapping seabird sensitivity to offshore wind farms. *PLoS ONE*, 9, e106366. doi:10.1371/journal.pone.0106366.

[15] Garthe, S and Hüppop, O. (2004) Scaling possible adverse effects of marine wind farms on seabirds: Developing and applying a vulnerability index. *Journal of Applied Ecology*, 41, 724-734.

[16] Gittings, T. & O'Donoghue, P. (2016) Disturbance response of red-breasted merganers *Mergus* serrator to boat traffic in Wexford Harbour. *Irish Birds*, 10, 329-334.

[17] Robbins, A. (2017) Seabird ecology in high-energy environments: approaches to assessing the impacts of marine renewables. PhD Thesis. University of Glasgow.

be discernible above background levels (median noise levels around the UK range from 81.5 to 95.5 dB re 1 µPa)[18].

The Applicant anticipated there to be 827 vessel movements during the construction period. Construction vessels such as the larger CLVs and barges that have difficulty in manoeuvring will have a rolling safe passage distance of up to 700 m. It is likely that each vessel will only be present in any one area of rolling safe passage distance for very short durations (hours to days). As vessel traffic levels are high in the Channel and Solent area, it was determined that red-breasted merganser and little tern would be habituated to such levels of disturbance.

As the worst-case scenario for cable repair was expected to be once every 10-12 years, the potential for disturbance and displacement was considered to be less during operation than construction.

The HRA Report considered the potential for in-combination disturbance and displacement effects on red-breasted merganser and little tern to be highly localised and temporary.

5.2.1.2. Indirect effects

Red-breasted merganser, little tern, Sandwich tern and common tern are considered to be of moderate sensitivity to habitat disturbance[19] [20]. Disturbance of seabed habitat can also potentially impact their prey species subsequently limiting food sources.

HDD will be used within Langstone Harbour where numbers of foraging birds are high. Entry/exit points of the drill are expected to be onshore. As such, material effects associated with increased SSC on prey species within the Harbour are not considered likely. Excavation at the marine HDD pits and cable installation is expected to transport fine sediments up to 10 km from the release point, with low SSC predicted at this distance (<5 mg/L). As this is not discernible above natural variation (<5 to 75 mg/L in coastal areas), the Applicant determined effects on prey species to be non-material.

The area of disturbed habitat within the marine cable corridor is expected to be a maximum of 3.6 km^2. Red-breasted merganser have a preference for shallow coastal waters[21] and little tern have a mean-maximum foraging range of 6.3 km ± 2.4 km[22]. Therefore, both species are not expected to be present in high densities beyond KP21, where the designated disposal site will be located. Peak concentrations of up to 200 mg/L may be observed locally in the nearshore area which may persist for several hours following completion of works. Sediment plume modelling predicted transportation of up to 5 km at which point concentrations of 5 to 10 mg/L are predicted. SSC is expected to return to background levels within several days. The assessment determined that most prey species can tolerate changes in SSC due to exposure to frequent storm induced fluctuations in sediment concentrations and high background levels of suspended sediment in the Solent[23].

[18] Merchant, N.D., Brookes, K.L., Faulkner, R.C., Bicknell, A.W.J., Godley, B.J. and Witt, M.J. (2016). Underwater noise levels in UK waters. *Scientific Reports,* 6: 36942. doi: 10.1038/srep36942.

[19] Bradbury, G., Trinder, M., Furness, B., Banks A.N., Caldow R.W.G. (2014) Mapping seabird sensitivity to offshore wind farms. *PLoS ONE*, 9, e106366. doi:10.1371/journal.pone.0106366.

[20] Garthe, S and Hüppop, O. (2004) Scaling possible adverse effects of marine wind farms on seabirds: Developing and applying a vulnerability index. *Journal of Applied Ecology*, 41, 724-734.

[21] Robbins, A. (2017) Seabird ecology in high-energy environments: approaches to assessing the impacts of marine renewables. PhD Thesis. University of Glasgow.

[22] Thaxter, C., Lascelles, B., Sugar, K., Cook, A., Roos, S., Bolton, M., Langston, R. and Burton, N. (2012) Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. *Biological Conservation*, 156, 53-61.

[23] Guillou N., Rivier A., Chapalain G., Gohin F. (2017). The impact of tides and waves on near-surface suspended sediment concentrations in the English Channel. *Oceanologia,* 59, pp. 28—36.

The use of cable non-burial protection outside of Langstone Harbour was considered to have no permanent effect on loss of prey species and benthic habitat due to its limited predicted spatial extent (~0.74 km^2).

The worst-case scenario for the requirement of marine cable repair is once every 10-12 years. Works would be short in duration and localised in nature. Therefore, the predicted impacts from increased SSC during maintenance are considered to be lower than during construction.

The Applicant considered the potential indirect in-combination impacts on seabed habitat and prey availability on red-breasted merganser, little tern, Sandwich tern, common tern and their supporting habitat to be localised and temporary.

5.2.2. Redshank, shelduck, pintail, shoveler, teal, wigeon, bar-tailed godwit, black-tailed godwit, curlew, grey plover, dark-bellied brent goose, waterfowl assemblage and supporting habitat: Alone

5.2.2.1. Disturbance and displacement

The ornithological features of the SPA are considered to be of moderate to high sensitivity to disturbance. All species were recorded during surveys undertaken for the Project with the exception of wigeon. Only dark-bellied brent geese were recorded in both intertidal and terrestrial areas [APP-421].

Construction activities associated with HDD works within Langstone Harbour and onshore cable route works in and adjacent to functionally linked SWBGS sites were determined to have the potential to disturb dark-bellied brent geese during roosting and foraging[24]. Owens (1977) showed that brent geese quickly become habituated to most sounds, but unexpected noise events put the geese into flight[25].

Construction works have the potential to displace ornithological features of the sites from favoured foraging and roosting habitat through unpredictable noise events. The construction work within the SWBGS sites was noted as reducing the availability of grassland foraging habitat where the construction stage overlaps with the winter season. The following SWBGS sites overlap with the onshore components of the Project:

- P25 – University of Portsmouth, Langstone Campus;
- P23B – University of Portsmouth;
- P23A – Milton Common north 1;
- P23R – Milton Common north 2;
- P11 – Kendall's Wharf playing fields; and
- P08A – Farlington Playing Fields.

The Applicant noted that as the Project is within an industrialised setting, noise effects are not expected to add to baseline conditions. It was also noted that the Order limits do not overlap with the SPA itself, other than where HDD routes underlie the sites.

To avoid an AEoI, the Applicant proposed mitigation in the form of winter working principles which restrict works during the winter period (October to March). These were discussed and refined in consultation with NE during Examination. The final six principles are set out in the Onshore Outline CEMP [REP9-005] and would be secured through Requirement 15 of the Recommended DCO. The principles are as follows:

- **Principle 1**: Construction works cannot take place in SWBGS (those categorised as either core, primary support, secondary support, low use or candidate) sites that overlap with the Project's Order Limits during October – March. An exception is the gravel car park within site P11 that is

[24] SWBGS Steering Group (2018) Solent Waders and Brent Goose Strategy Guidance on Mitigation and Off-setting Requirements.

[25] Owens, N. W. 1977. Responses of Wintering Brent Geese to Human Disturbance. *Wildfowl*, 28 (28):10.

already disturbed by movements of cars, lorries and plant, and offers no functional habitat for brent geese or other waterbirds associated with Chichester and Langstone Harbours SPA.

- **Principle 2**: Where HDD works are to take place underneath the SWBGS site (e.g. at Eastney Landfall) no direct impacts are considered to occur and the restriction does not apply.
- **Principle 3**: Elements of the Onshore Cable Route that are over 400 m from the SPA are not included in any restriction.
- **Principle 4**: Construction noise events of <55 dB can occur unrestricted.
- **Principle 5**: Construction works of 55 – 72 dB LAmax[26] immediately adjacent to a major road and/or adjacent to industrial sites with notable levels (>60 dB) of existing noise can be undertaken unrestricted. Noise levels from the Project would be masked in these instances.
- **Principle 6**: Percussive piling or works with heavy machinery (i.e. plant resulting in a noise level in excess of 69 dB LAmax – measured at the sensitive receptor) should be avoided during the bird overwintering period (i.e. October to March inclusive. The sensitive receptor is the nearest point of the SPA or any SPA supporting habitat (e.g. high tide roosting site).

Redshank, shelduck, pintail, shoveler, teal, wigeon, bar-tailed godwit, black-tailed godwit, curlew and grey plover were recorded as present only in the intertidal area during surveys carried out for the Project. Therefore, only Principles 3 – 6 apply to these species. Principles 1 – 6 apply to dark-bellied brent goose.

The HRA Report noted that with the adoption of Principle 1 (and reference to Principle 2), this would ensure that no adverse effects on SWBGS sites that lie within the Order Limits (as these sites will not be subject to works in the winter period), or on birds within the SPA. The Applicant noted that trench/road saw noise has the potential to affect fourteen SWBGS sites. However, a number of these sites will not have overlap with predicted noise of 69 dB LAmax and numerous buildings act as a buffer between construction and other sites. In the remaining SWBGS sites, Principle 5 was considered to apply as the environment is urbanised and construction is restricted to during October - March. Noise mitigation within the Onshore Outline CEMP stipulates that a screening of at least 2 m in height must be erected around the perimeter of HDD compounds. The Applicant ascertained that this will also reduce visual disturbance to indistinguishable levels.

NE raised concerns about AEoI from visual disturbance and disputed the Applicant's conclusion. In response, the Applicant highlighted that the Project is situated within an entirely urbanised environment subject to consistent visual disturbance. It also noted recent research has established that visual disturbance does not have a significant impact on waterbirds in an estuary close to conurbations[27]. Winter working principles will apply where the onshore cable route is adjacent to the SPA or SWBGS sites.

Further analysis was undertaken by the Applicant following consultation with NE. This work was presented to NE as the Construction Noise and SWGBS report [REP1-149] and highlights SWBGS and areas of the SPA that would be subject to winter working restrictions in order to meet the principles. Further information was also provided by the Applicant about the proposed screening around work compounds that demonstrated to NE's satisfaction that it would provide effective visual as well as noise mitigation at installation sites slightly further away [EV-032 to EV-035].

5.2.2.2. Indirect effects

Potential indirect effects on several SWBGS sites within the Order limits were assessed by the Applicant. Construction work within these sites would result in temporary habitat loss which would impact the availability of foraging and roosting resource to dark-bellied brent geese. The two approaches proposed by the Applicant for reinstatement of the sites are as follows:

[26] LAmax is the maximum value that the A-weighted sound pressure level reaches during a measurement period.

[27] Goss-Custard, J.D., Hoppe, C., Matt, H. and Stillman, R. A. (2020). Disturbance does not have a significant impact on waders in an estuary close to conurbations: importance of overlap between birds and people in time and space. *Ibis*, 162 (3), 845-862.

- Re-seeding areas within SWBGS sites with grass seed before the end of May where practicable; and
- Re-turfing where it is not practicable to re-seed. This is more costly but allows re-establishment in a shorter timescale.

The decision as to which approach will be used will be dependent on the time available over the summer growing season for implementation, as re-seeding will not be the optimal technique after May. Further details on the measures including site preparation, establishment and aftercare are provided in the Onshore Outline CEMP [REP9-005]. The amount of habitat that will require restoration work in October and the proportion of that which is part of the SWBGS sites, and the wider network, will be taken into consideration.

5.2.3. Redshank, shelduck, pintail, shoveler, teal, wigeon, bar-tailed godwit, black-tailed godwit, curlew, grey plover, dark-bellied brent goose, waterfowl assemblage and supporting habitat: In-combination

Relevant representations from NE [RR-181] and Portsmouth City Council [RR-185] raised concerns about the adequacy of the in-combination assessment for effects on SPAs and Ramsar sites with functionally linked land. In particular, this was in relation to the programme of coastal flood defence works on Portsea Island. The Applicant provided an update in an ES Addendum [REP1-139] and updated the HRA Report to provide an in-combination assessment to address the points raised.

The Applicant considered the potential in-combination effects resulting from other plans and projects to be localised and temporary. The HRA Report highlighted that the North Portsea Island FCEMS Phase 4B includes a full winter working restriction (October - March) so would not disturb dark-bellied brent geese. Such winter working restrictions have been adopted by other plans and projects which have been identified as potentially affecting wintering bird features of the SPA or SWBGS as outlined in Appendices 16.15 and 16.16 of the ES ([APP-423] and [APP-424]).

NE raised a related issue during Examination regarding Milton Common bird refuge areas. Information submitted by Portsmouth City Council led NE to believe that one part of Milton Common had been established as a refuge for dark-bellied brent geese by way of mitigation or compensation for works associated with the North Portsea Island FCEMS Phase 4B, and that another site to be designated as a refuge was to come forward. The ExA expressed concern that these might comprise areas secured as sites compensating for damage to a protected site and the consequential implications for the HRA as the Order limits for the Project include some parts of Milton Common.

The Applicant contended that no effective bird refuge has been established on Milton Common, that it had not been evidenced that a bird refuge could be successfully established on Milton Common, and that there is no such planning permission or management plan that would require such areas to be established. The Applicant based this on a site visit and research into the planning history [AS-067].

The matter was addressed in the SoCG between the Applicant and NE and shown as agreed, reporting that the Applicant had discussed the matter with NE on 11 February 2021 [REP8-031]. The Applicant outlined that there is no extant planning permission or management plan in relation to such areas being established. As such, the Applicant did not consider that there are any implications for the HRA. The Applicant went on to note that, should the ExA take a view that the establishment of a refuge is nevertheless lawful, then winter working principle 1 would apply in any case, and adequate mitigation was already secured through the Onshore Outline CEMP [REP9-005] and Requirement 15. The ExA stated its agreement with this position.

5.2.4. All features: Alone and in-combination

5.2.4.1. Accidental spills and litter

Unplanned oil or chemical spillages could potentially affect the ornithological features and supporting habitat of the SPA and Ramsar site, resulting in mortality of birds and prey species utilising the water

column and intertidal habitats. Unplanned disposal of industrial or user plastic also has the potential to cause mortality of birds and prey species through ingestion and entanglement. For the marine features of the sites for which potential LSE could not be excluded (red-breasted merganser, little tern, Sandwich tern, common tern, and supporting habitat), the HRA Report stated that through routine mitigation measures of standard best practice in terms of waste management, pollution prevention and strict navigational protocols, these events would be prevented from occurring. These procedures are described in the Outline Marine CEMP [APP-488] which will be secured through the dML as part of the Recommended DCO. The measures are summarised in Section 5.1.2.2.

In the context of the remaining intertidal and onshore features which were assessed, the Applicant highlighted that routine mitigation measures of standard best practice will be observed. These are described within the Onshore Outline CEMP [REP9-005] and incorporated in a Materials Management Plan ("MMP") and Site Waste Management Plan ("SWMP"). The Onshore Online CEMP will be secured through Requirement 15 of the Recommended DCO.

The key matters of the SWMP are as follows:

- Identify the volume of waste streams likely to be produced during the works to establish the potential for reuse and recycling;
- Identify possible options for waste to be ‘designed out’;
- Identify opportunities for waste minimisation and management;
- Identify the most significant opportunities to increase re-use and recycling rates;
- Identify suitable waste management contractors and record appropriate licences, permits, waste transfer notes and hazardous waste consignment notes; and
- Consider appropriate site practices such as how materials will be segregated and the measures that will be used for raising awareness among site operative for waste reduction, reuse and recycling.

Measures captured within the Onshore Outline CEMP relevant to intertidal pollution control include:

- Designated areas for the storage of hazardous materials, fuels and chemicals; On-site availability of oil spill clean-up equipment including absorbent material and inflatable booms for use in the event of an oil spill or leak;
- Use of drip trays under mobile plant; and
- Drain socks to trap sediment entering the watercourse.

The Applicant concluded there would be no in-combination impacts on the SPA and Ramsar site due to the scale and nature of other plans and projects considered in the assessment and their requirement to also adhere to similar best practice measures.

5.2.5. Conclusions

The Applicant concluded there to be no AEoI on the Chichester and Langstone Harbours SPA and Ramsar site alone or in-combination as a result of the Project. NE initially disputed the Applicant’s conclusion of no AEoI on the SWBGS sites. However, once the timing and the type of turfing for the reinstatement of the sites was proposed, the Applicant and NE agreed that there would be no AEoI.

The Secretary of State agrees with the positions of NE and that of the ExA, that no AEoI alone or in-combination as a result of the Project can be concluded.

5.3. Appropriate Assessment: Portsmouth Harbour SPA and Ramsar site

The Portsmouth Harbour SPA covers approximately 1,248.77 ha and together with the adjacent Chichester and Langstone Harbours, forms one of the most important sheltered intertidal areas on the south coast of England. The site is located approximately 4.9 km from the Project.

Portsmouth Harbour SPA qualifies under article 4.2 of the Birds Directive (79/402/EEC) by supporting internationally or nationally important wintering populations of the following migratory species: dark-belled brent geese (1.3% of the north-west European population and 2.5% of the British wintering population), red-breasted merganser (1% of the British wintering population), black-tailed godwit (over 1% of the British wintering population) and dunlin (over 1% of the British wintering population)[28].

Portsmouth Harbour Ramsar site, which is coincident with the SPA, qualifies under Ramsar criterion 3 for its intertidal mudflat areas which possess extensive beds of eelgrass *Zostera angustifolia* and *Zostera noltei*. The mud-snail *Hydrobia ulvae* is found in extremely high densities, common cord-grass *Spartina anglica* dominates large areas of the saltmarsh and there are extensive areas of green algae *Enteromorpha* spp. and sea lettuce *Ulva lactuca*. Locally the saltmarsh is dominated by sea purslane *Halimione portulacoides* which gradates to more varied communities at the higher shore levels. The site includes a number of saline lagoons hosting nationally important species.

Site-specific supplementary advice on conservation objectives for the Portsmouth Harbour SPA was available. Table 3 lists attributes which were considered to be equivalent to those impacts for which a LSE could not be excluded.

Table 3: Supplementary advice attributes assessed for the Portsmouth Harbour SPA.

Feature	Impact for which LSE could not be excluded	Equivalent supplementary advice attribute
Red-breasted merganser	Accidental spills and litter	Supporting habitat: water quality – contaminants
Dark-bellied brent goose	Disturbance and displacement	Disturbance caused by human activity
Dark-bellied brent goose Dunlin Black-tailed godwit	Accidental spills and litter	Supporting habitat: food availability

The site also qualifies under Ramsar criterion 6 for supporting dark-bellied brent goose[29].

During Examination, Natural England requested that potential LSE on supporting habitat (water column, and freshwater and coastal grazing marsh) was also considered in addition to the marine ornithological features of the site [APP-025] and [APP-504].

5.3.1. Dark-bellied brent goose and supporting habitat: Alone

5.3.1.1. Disturbance and displacement

Dark-bellied brent geese are considered to be of high sensitivity to disturbance[30]. Construction activities associated with HDD works in Langstone Harbour and onshore cable route works in and adjacent to SWBGS sites have the potential to disturb roosting and foraging dark-bellied brent geese[31]. Owens (1977) showed that dark-bellied brent geese quickly become habituated to most sounds, but unexpected sounds

[28] http://publications.naturalengland.org.uk/publication/4857883850178560

[29] https://rsis.ramsar.org/ris/720

[30] Cutts N, Hemingway K and Spencer J (2013). The Waterbird Disturbance Mitigation Toolkit Informing Estuarine Planning and Construction Projects. Produced by the Institute of Estuarine and Coastal Studies (IECS). Version 3.2.

[31] SWBGS Steering Group (2018) Solent Waders and Brent Goose Strategy Guidance on Mitigation and Off-setting Requirements.

put the geese into flight[32]. Studies undertaken as part of the Project recorded high numbers of the species in both intertidal and terrestrial components of the Study Area [APP-421].

Construction works have the potential to displace wintering geese from favoured foraging and roosting habitat through unpredictable noise events. The construction work within the SWBGS sites was noted as reducing the availability of grassland foraging habitat where the construction stage overlaps with the winter season. The SWBGS sites which overlap with the onshore components of the Project are listed in Section 5.2.2.1.

To avoid an AEoI, the Applicant proposed mitigation in the form of winter working principles outlined in Section 5.2.2.1. The final six principles are set out in the Onshore Outline CEMP [REP9-005] and would be secured through Requirement 15 of the Recommended DCO. The Applicant also proposed to erect screening of at least 2 m in height around the perimeter of HDD compounds. This is also stipulated in the Onshore Outline CEMP. The Applicant determined that this reduced visual disturbance to indistinguishable levels.

The concerns NE raised regarding AEoI from visual disturbance associated with the Chichester and Langstone Harbours SPA and Ramsar site were also highlighted for Portsmouth Harbours SPA and Ramsar site. The Applicant's response, as detailed in Section 5.2.2.1, noted that the Project is situated within an urbanised environment subject to consistent visual disturbance. Winter working principles would apply where the onshore cable route is adjacent to the SPA or SWBGS sites. Further analysis was undertaken by the Applicant following consultation with NE. This work was presented to NE as the Construction Noise and SWGBS report [REP1-149] and highlights SWBGS sites and areas of the SPA that would be subject to winter working restrictions in order to meet the principles. Further information was also provided by the Applicant about the proposed screening around work compounds that demonstrated to NE's satisfaction that it would provide effective visual as well as noise mitigation at installation sites slightly further away [EV-032 to EV-035].

5.3.1.2. Indirect effects

As outlined in Section 5.2.2.2, functionally linked SWBGS sites were also assessed for indirect effects. Construction work within the sites would result in temporary habitat loss which would impact on the availability of foraging and roosting resource to dark-bellied brent geese. The Applicant outlined two approaches to mitigating impacts from construction: re-seeding areas within SWBGS sites before the end of May where practicable, and re-turfing areas where it is not practicable to re-seed.

The decision as to which approach will be used will be dependent on the time available over the summer growing season for implementation. Further details on the measures including site preparation, establishment and aftercare are provided in the Onshore Outline CEMP [REP9-005]. The amount of habitat that will require restoration work in October and the proportion of that which is part of the SWBGS sites and the wider network, will be taken into consideration.

5.3.2. Dark-bellied brent goose and supporting habitat: In-combination

Concerns were raised by Portsmouth City Council [RR-185] and NE [RR-181] in relation to the adequacy of the in-combination assessment for effects on SPAs and Ramsar sites, as well as functionally linked SWBGS sites. These concerns which apply to the Chichester and Langstone Harbours SPA and Ramsar site are also relevant to the Portsmouth Harbour SPA and Ramsar site and are summarised in Section 5.2.3. The Applicant updated an ES Addendum to address this [REP1-139], and also updated the HRA Report to provide an in-combination assessment which responded to the points raised.

The Applicant assessed the potential in-combination impacts resulting from the plans and projects which had temporal and spatial overlap with the Project ([APP-423] and [APP-424]). Potential in-combination impacts were considered to be localised and temporary. The Applicant highlighted that the North Portsea

[32] Owens, N. W. 1977. Responses of Wintering Brent Geese to Human Disturbance. *Wildfowl*, 28 (28):10.

Island FCEMS Phase 4B includes a full winter working restriction (October – March) so would not disturb features of the SPA. Such restrictions have also been adopted by other plans and projects identified as potentially affecting wintering bird features of the SPA and Ramsar site, or SWBGS sites.

The related issue which NE raised regarding Milton Common bird refuge areas is also relevant to Portsmouth Harbours SPA and Ramsar site. This is outlined in Section 5.2.3. The matter was addressed in the SoCG between the Applicant and NE and is shown as agreed, reporting that the Applicant had discussed the matter with NE on 11 February 2021 [REP8-031].

5.3.3. All features: Alone

5.3.3.1. Accidental spills and litter

Unplanned oil or chemical spills could potentially affect the ornithological features and supporting habitat of the sites through mortality of birds and prey species. Unplanned disposal of industrial or user plastic could also potentially cause mortality of birds and prey species through ingestion and entanglement. In terms of the marine features of the sites (dark-bellied brent goose, red-breasted merganser, dunlin and black-tailed godwit), the Applicant stated that through routine mitigation measures of standard best practice in terms of waste management, pollution prevention and strict navigational protocols, there would be no adverse effects. These procedures are described in the Outline Marine CEMP [APP-488] which will be secured through the dML as part of the Recommended DCO. The measures are summarised in Section 5.1.2.2.

Dark-bellied brent goose as an onshore feature of the Portsmouth Harbour Ramsar site, and supporting freshwater and coastal grazing marsh habitat, could also potentially be impacted by unplanned oil or chemical spills and unplanned disposal of plastic waste. The Applicant highlighted routine mitigation measures of standard best practice would be implemented to reduce the likelihood of pollution events to as low as reasonably practicable. These are summarised in the Onshore Outline CEMP [REP9-005] which will be secured through Requirement 15 of the Recommended DCO. The details of these measures are outlined in Section 5.2.4.1.

The potential in-combination effects related to pollution events were considered to be localised and temporary. The Applicant also highlighted the requirement of other plans or projects to adhere to similar best practice measures.

5.3.4. Conclusions

The Applicant concluded there to be no AEoI on the Portsmouth Harbours SPA and Ramsar alone or in-combination as a result of the Project. NE initially disputed the Applicant's conclusion of no AEoI on the SWBGS sites. However, once the timing and the type of turfing for reinstatement of the sites was proposed, the Applicant and NE agreed that there would be no AEoI.

The Secretary of State agrees with the position of NE that there will be no AEoI alone or in-combination as a result of the Project subject to the implementation of mitigation measures.

5.4. Appropriate Assessment: Solent and Southampton Water SPA

The Solent and Southampton Water SPA is located in one of the only major sheltered channels in Europe and covers approximately 5401 ha. The site is approximately 6.6 km from the Project and lies between the Isle and Wight and the south coast of England.

The site qualifies under article 4.1 of the Birds Directive (79/409/EEC) as it is used regularly by 1% or more of the British population of: Mediterranean gull (8.2 – 13.9%), Sandwich tern (1.7%), common tern (2.2%), little tern (2%), and roseate tern (3.1%).

The site also qualifies under article 4.2 of the Birds Directive (79/409/EEC) as it is used regularly by 1% or more of the biogenic populations of the following regularly occurring migratory species in any season:

dark-bellied brent goose (2.5% western Siberian/western European population), teal (1.1% north-western European population), ringed plover (1.1% European/north-west African population), and black-tailed godwit (1.6% Icelandic population). The SPA is also used regularly by over 20,000 waterfowl or seabirds in any season[33].

Site-specific supplementary advice on conservation objectives was available for the Solent and Southampton Water SPA. Table 4 lists attributes which were considered to be equivalent to those impacts for which a LSE could not be excluded.

Table 4: Supplementary advice attributes assessed for the Solent and Southampton Water SPA.

Feature	Impact for which LSE could not be excluded	Equivalent supplementary advice attribute
Little tern Sandwich tern Common tern Roseate tern	Accidental spills and litter	Supporting habitat: water quality – contaminants

During Examination, Natural England requested that potential LSE on supporting habitat (water column) was also considered in addition to the marine ornithological features of the site [APP-025] and [APP-504].

5.4.1. Little tern, common tern, Sandwich tern, roseate tern, Mediterranean gull and supporting habitat: Alone and in-combination

5.4.1.1. Accidental spills and litter

The HRA Report's assessment considered that unplanned oil or chemical spills from vessels may occur during all phases of the Project. Spills have the potential to result in mortality of ornithological features through directly oiling or through effects on prey species. Unplanned disposal of industrial or user plastic during all phases of the Project may also affect species through ingestion or entanglement. The Applicant determined that through implementation of routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols, these events would be prevented from occurring. The procedures are described in the Outline Marine CEMP [APP-488] which would be secured through the dML as part of the Recommended DCO. The measures are summarised in Section 5.1.2.2.

The in-combination assessment considered the scale and nature of other plans and projects which have temporal and spatial overlap with the Project. It highlighted that other plans and projects in the assessment are also required to adhere to similar best practice measures.

The Applicant concluded there would be no AEoI on the Solent and Southampton Water SPA alone or in-combination as a result of the Project. This conclusion was not disputed by any Interested Party. In its RR, NE stated that AEoI on the site could be excluded beyond reasonable scientific doubt [RR-181]. This was finalised in the final SoCG between the Applicant and NE [REP8-031]. The Secretary of State agrees with this conclusion.

5.5. Appropriate Assessment: Pagham Harbour SPA

The Pagham Harbour SPA covers 629.01 ha and lies between Bognor Regis and Chichester in West Sussex. The site is situated approximately 9.5 km from the Project. The estuarine basin is made up of a

[33] http://publications.naturalengland.org.uk/publication/6567218288525312

central area of saltmarsh and intertidal mudflats, surrounded by lagoons, open water, shingle, reed swamp and wet permanent grassland.

The SPA qualifies under article 4.1 of the Bird Directive by supporting the following internationally important populations of regularly occurring Annex I species: common tern (>1% British population), little tern (>1% British population) and ruff (10% British wintering population).

The site also qualifies under 4.2 of the Birds Directive in that it supports internationally important populations of regularly occurring migratory dark-bellied brent goose (2% European wintering population)[34].

The site also supports nationally important wintering populations of the following species: pintail (1%), grey plover (3%) and black-tailed godwit (7%).

Site-specific supplementary advice on conservation objectives was available for the Pagham Harbour SPA. Table 5 lists attributes which were considered to be equivalent to those impacts for which a LSE could not be excluded.

Table 5: Supplementary advice attributes assessed for the Pagham Harbour SPA.

Feature	Impact for which LSE could not be excluded	Equivalent supplementary advice attribute
Common tern	Accidental spills and litter	Supporting habitat: water quality – contaminants

During Examination, Natural England requested that potential LSE on supporting habitat (water column) was also considered in addition to the marine ornithological features of the site [APP-025] and [APP-504].

5.5.1. Common tern and supporting habitat: Alone and in-combination

5.5.1.1. Accidental spills and litter

Unplanned oil or chemical spills could potentially cause mortality of common tern through direct oiling and could have sublethal effects on prey species of juvenile fish thus impacting prey availability. Unplanned disposal of industrial or user plastic could also result in mortality of birds and prey species through ingestion and entanglement. The Applicant determined that with implementation of routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols, these events would be prevented from occurring. These procedures are described in the Outline Marine CEMP [APP-488] which will be secured through the dML as part of the Recommended DCO. The measures are summarised in Section 5.1.2.2.

The Applicant's in-combination assessment took account of the scale and nature of other plans and projects with temporal and spatial overlap with the Project. The Applicant noted that other plans and projects would also be required to adhere to similar best practice measures.

The HRA Report concluded that there would be no AEoI on Pagham Harbour SPA alone or in-combination resulting from the Project. This was not disputed by any Interested Party. It its RR, NE stated that it could be excluded beyond reasonable scientific doubt that the Project would have an AEoI on the site [RR-181]. This was agreed with the Applicant and finalised in the final SoCG [REP8-031]. The Secretary of State agrees with this conclusion.

[34] http://publications.naturalengland.org.uk/publication/3143422

5.6. Appropriate Assessment: River Itchen SAC

The River Itchen SAC covers 303.26 ha and is a chalk river which is mainly spring-fed with only a narrow seasonal variation in physical and chemical characteristics. The river's aquatic flora is species rich with many typical chalk stream plants present in abundance. The SAC is 27.5 km from the Project at its closest point.

The site is designated under article 4(4) of the Directive (92/43/EEC) as it hosts the Annex I listed habitat water courses of plain to montane levels with *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (Rivers with floating vegetation often dominated by water crow-foot).

The site is also designated under article 4(4) of the Habitats Directive (92/43/EEC) as it hosts the following species listed as Annex II: Atlantic salmon, brook lamprey, bullhead, otter *Lutra lutra*, southern damselfly *Coenagrion mercuriale*, and white-clawed crayfish *Austropotamobius pallipes*[35].

Site-specific supplementary advice on conservation objectives was available for the River Itchen SAC. Table 6 lists attributes which were considered to be equivalent to those impacts for which a LSE could not be excluded.

Table 6: Supplementary advice attributes assessed for the River Itchen SAC.

Feature	Impact for which LSE could not be excluded	Equivalent supplementary advice attribute
Salmon	Increased SSC Pollution events	Population: adult run size Population: juvenile densities Supporting habitat: biological connectivity Supporting processes: integrity of off-site habitats

5.6.1. Atlantic salmon: Alone and in-combination

5.6.1.1. Increased SSC

Atlantic salmon show a high degree of site fidelity and are known to use coastal waters for migration. As such, LSE could not be excluded as increased SSC could create a barrier to migration or cause respiratory effects from depleted oxygen. Cable installation and associated works, including dredge and disposal, route clearance and rock placement within offshore and nearshore areas have the potential to increase SSC.

The activity most likely to result in increased SSC in the offshore area was considered to be deposition of dredge material which may be required for sandwave clearance prior to cable installation. Peak SSC of 1000 mg/L could arise within 1 km of the release point. Coarser sediment will fall out of suspension almost immediately. The passive plume will likely be transported beyond 1 km in the direction of the prevailing flow and out to a distance of approximately 25 km. The plume is predicted to generate SSC of approximately 20 mg/L.

The activities most likely to result in increased SSC in the nearshore area were considered to be excavation at the HDD pits and cable installation. The marine HDD exit/entry landfall location is approximately 1 km off the coast of Eastney and will be excavated using a backhoe dredger or Mass Flow Excavator. The total volume to be excavated is up to 2,700 m^3. Peak SSCs of up to 200 mg/L are predicted to be observed within 2 km of activities and could persist for several hours following completion

[35] http://publications.naturalengland.org.uk/publication/5130124110331904

of works. Sediment plumes are likely to be transported up to 5 km away with predicted concentrations of 5 – 10 mg/L. SSC is predicted to reduce to background levels (<1 – 6 mg/L) within a few days.

Depending on the quantity, quality and duration of the exposure to increased SSC, this can elicit short and long-term responses from biota. The greatest impact of suspended sediment on migratory fish is on incubating eggs and larval stages[36]. As salmon spawn in freshwater, there is no impact pathway on salmon eggs or larvae. Adult salmon are able to swim through or navigate around an impacted area and are inherently tolerant of naturally high and variable background levels of suspended sediment[37]. This is also true for smolts as they develop in a riverine environment and are frequently exposed to increases in sediment due to flood events and land run off.

The Applicant considered the impact from increased SSC to be small and localised. Atlantic salmon were considered to generally lack sensitivity to increased SSC. All other activities which may result in in-combination effects were considered likely to be similar or lesser in extent and magnitude.

5.6.1.2. Pollution events

Pollution events as a result of accidental releases of substances such as pesticides, anti-foulants or bentonite from vessels during all phases of development could not be ruled out for LSE. Spills have the potential to directly affect both adult salmon and smolts during their spawning or seaward migrations given their sensitivity to pollution and preference for surface waters. The HRA Report considered that routine mitigation measures of standard best practice in terms of waste management and pollution prevention measures, as well as strict navigational protocols, would reduce the risk of pollution events as far as reasonably practicable. These procedures are described in the Outline Marine CEMP [APP-488] which will be secured through the dML as part of the Recommended DCO. The measures are summarised in Section 5.1.2.2.

The in-combination assessment considered the scale and nature of other potential plans and projects and noted the requirement for them to also adhere to similar best practice measures.

5.6.2. Conclusions

Based on the evidence put forward in the HRA Report, the Applicant concluded there would be no AEoI on the River Itchen SAC alone or in-combination with other plans or projects. This conclusion was not disputed by any Interested Party. NE stated it was satisfied that it could be excluded beyond reasonable scientific doubt that the Project would not have an AEoI on the site [RR-181]. This was agreed and confirmed in the final SoCG between the Applicant and NE [REP8-031]. The Secretary of State agrees with this conclusion.

5.7. Appropriate Assessment: River Avon SAC

The River Avon SAC covers 498.24 ha and is located approximately 51.4 km from the Project at its closest point. Along with its tributaries the SPA comprises a large, lowland river system, with sections running through greensand, clay and chalk. Stream water-crowfoot *Ranunculus penicillatus* ssp. *pseudofluitans* and river water-crowfoot *R. fluitans* are the main dominants. There is an extensive population of Desmoulin's whorl snail *Vertigo moulinsiana* along the margins and associated wetland of the Rivers Avon, Bourne and Wylye.

[36] Robertson, M. J., Scruton, D. A and Clarke, K. D. (2007). Seasonal effects of suspended sediment on the behaviour of juvenile Atlantic salmon. *Transactions of the American Fisheries Society*. 136, pp 822-828. 10.1577/T06-164.1.

[37] Heard, J.R. (2007). *Salmo salar* Atlantic salmon. In Tyler-Walters, H. and Hiscock, K. (eds) Marine Life Information Network: Biology and Sensitivity Key Information Reviews. Plymouth: Marine Biological Association of the United Kingdom. Available from: https://www.marlin.ac.uk/species/detail/2096

The river system supports a diverse fish community with the bullhead being an important component and a stable population of brook lamprey. The Avon also supports Atlantic salmon populations typical of a high-quality chalk stream.

The site qualifies under article 4(4) of the Habitats Directive (92/43/EEC) as it supports the Annex I habitat water courses of plain to montane levels with the *Ranunculus fluitantis* and *Callitricho-Batrachion* vegetation (Rivers with floating vegetation often dominated by water-crowfoot).

The site also qualifies under the same article by supporting the following Annex II species: bullhead, brook lamprey, sea lamprey *Petromyzon marinus*, Atlantic salmon, and Desmoulin's whorl snail[38].

Site-specific supplementary advice on conservation objectives was available for the River Avon SAC. Table 7 lists attributes which were considered to be equivalent to those impacts for which a LSE could not be excluded.

Table 7: Supplementary advice attributes assessed for the River Avon SAC.

Feature	Impact for which LSE could not be excluded	Equivalent supplementary advice attribute
Salmon	Increased SSC Pollution events	Population: adult run size Population: juvenile densities Supporting habitat: biological connectivity Supporting processes: integrity of off-site habitats
Sea lamprey	Increased SSC Pollution events	Population: population abundance Population: juvenile densities Supporting habitat: biological connectivity Supporting processes: integrity of off-site habitats

5.7.1. Atlantic salmon and sea lamprey: Alone and in-combination

5.7.1.1. Increased SSC

Atlantic salmon and sea lamprey are known to use coastal waters for migration. Increased LSE could potentially create a barrier to migration or cause respiratory effects from depleted oxygen.

Potential impacts from increased SSC could result from sediment released during cable installation and associated works such as dredge and disposal activities, rock placement and route clearance within the offshore and nearshore areas of the Project.

The activity most likely to result in increased SSC in the offshore area was considered to be deposition of dredge material which may be required for sandwave clearance prior to cable installation. Peak SSC of 1000 mg/L may arise within 1 km from the release point with a significant reduction of SSC within hours of disposition. Passive plume modelling showed that beyond 1 km from the release point SSC is likely to be in the region of 20 mg/L and may be transported out to a distance of approximately 25 km in the direction of the prevailing flow. Within a few days of completion of works, SSC concentrations are expected to return to background levels (<1 – 6 mg/L).

The activities most likely to result in increased SSC in the nearshore area were considered to be excavation at the HDD pits and cable installation. The marine HHD exit/entry landfall is situated

[38] http://publications.naturalengland.org.uk/publication/6048472272732160

approximately 1 km off the coast of Eastney (KP1 – KP1.6). The total volume expected to be excavated is up to 2,700m^3. Fine sediments may potentially be transported up to 10 km with low SSCs at these distances (<5 mg/L) which will not be discernible above natural variation. Peak SSCs of up to 200 mg/L may be observed within 2 km of the cable trench/HDD pit. These concentrations could persist for several hours after construction activities have ceased. Sediment plumes could potentially be transported up to 5 km from the cable trench/HDD pit. SSC concentrations of 5 to 10 mg/L are expected at this distance and predicted to return to background levels within days following cessation of activities.

The greatest impact of suspended sediment on migratory fish is on incubating eggs and larval stages due to a lack of mobility to move away from the impact[39]. As salmon spawn in freshwater there is no impact pathway on eggs or larvae. Adult salmon are able to swim through or navigate around areas impacted by increased SSC and are tolerant of high and variable background levels of suspended sediment[40]. This is also true for smolts as they develop in riverine environments which are exposed to variations in suspended sediment during flood events and land run off. Sea lamprey are considered to be less sensitive to SSC than salmonids[41] and are known to migrate through rivers and estuaries (both as adults and transformers) with very high SSC (>1000 mg/L) such as the Severn and Humber[42] [43].

The Applicant considered the effects of increased SSC resulting from the Project on sea lamprey and Atlantic salmon indiscernible against natural variation, and both features showed a lack of sensitivity to the impact. It considered that all other activities which may result in in-combination effects due to increased SSC were likely to be similar or lesser in extent and magnitude.

5.7.1.2. Pollution events

Unplanned oil or chemical spills could potentially impact adult salmon and smolts as well as sea lamprey and transformers during all phases of development. Potential impacts could occur during the spawning or seaward migrations of both species given their sensitivity to pollution and the preference of salmon for surface waters. The Applicant determined that through routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols, pollution events would be prevented from occurring. These procedures are described in the Outline Marine CEMP [APP-488] which will be secured through the dML as part of the Recommended DCO. These measures are summarised in Section 5.1.2.2.

As part of the in-combination assessment, the Applicant highlighted the requirement for other plans and projects to adhere to similar best practice measures which would reduce the risk of in-combination pollution events to as low as practicably possible.

5.7.2. Conclusions

The HRA Report concluded that there would be no AEoI alone or in-combination with other plans or projects on the River Avon SAC as a result of the Project. NE stated in its RR that it was satisfied that an

[39] Robertson, M. J., Scruton, D. A and Clarke, K. D. (2007). Seasonal effects of suspended sediment on the behaviour of juvenile Atlantic salmon. *Transactions of the American Fisheries Society*. 136, pp 822-828. 10.1577/T06-164.1.

[40] Heard, J.R. (2007). *Salmo salar* Atlantic salmon. In Tyler-Walters, H. and Hiscock, K. (eds) Marine Life Information Network: Biology and Sensitivity Key Information Reviews. Plymouth: Marine Biological Association of the United Kingdom. Available from: https://www.marlin.ac.uk/species/detail/2096

[41] Grabarkiewicz, J.D., Davis W.S. (2008). An introduction to freshwater fishes as biological indicators. EPA-260-R-08-016. U.S. Environmental Protection Agency, Office of Environmental Information, Washington, DC.

[42] FARL. (1995). Possible impacts of dredging on salmonids. Research Note for ABP Research. Fawley Aquatic Research Laboratories Ltd.

[43] Marshall, S., Elliott M. (1998). Environmental influences on the fish assemblage of the Humber estuary, U.K. *Estuarine Coastal and Shelf Science*. 46, pp. 175-184.

AEoI on the site resulting from the Project could be excluded beyond reasonable scientific doubt [RR-181]. This was confirmed in its final SoCG with the Applicant [REP8-031]. The Secretary of State agrees with this conclusion.

5.8. Appropriate Assessment: River Axe SAC

The River Axe SAC covers 25.78 ha and is situated approximately 168 km from the Project. The site contains a mixed geology of sandstone and limestones, giving rise to calcareous waters where stream water-crowfoot dominates, giving way to river water-crowfoot further downstream. The river supports diverse flora and a variety of river channel habitats which support an important fish community, including Atlantic salmon, sea lamprey, brook lamprey and bullhead.

The site is designated under article 4(4) of the Habitats Directive (92/43/EEC) as it hosts the Annex I habitat water courses of plain to montane levels with the *Ranunculus fluitantis* and *Callitricho-Batrachion* vegetation.

The site is also designated under article 4(4) of the Habitats Directive as is supports the following Annex II species: bullhead, brook lamprey, and sea lamprey[44].

Site-specific supplementary advice on conservation objectives was available for the River Axe SAC. Table 8 lists attributes which were considered to be equivalent to those impacts for which a LSE could not be excluded.

Table 8: Supplementary advice attributes assessed for the River Axe SAC.

Feature	Impact for which LSE could not be excluded	Equivalent supplementary advice attribute
Sea lamprey	Pollution events	Population: population abundance Population: juvenile densities Supporting habitat: biological connectivity Supporting habitat: integrity of off-site habitats

5.8.1. Pollution events: Alone and in-combination

Unplanned oil or chemical spills could potentially impact adult sea lamprey and transformers during their spawning or seaward migrations as they are sensitive to pollution. The Applicant concluded that with the implementation of routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols, pollution events would be prevented from occurring. These procedures are described in the Outline Marine CEMP [APP-488] which will be secured through the dML as part of the Recommended DCO. The measures are summarised in Section 5.1.2.2.

The Applicant considered the scale and nature of other plans and projects assessed and highlighted that the requirement for other plans and projects to adhere to similar best practice measures would reduce the risk of pollution events to as low as practicably possible.

The HRA Report concluded that there would be no AEoI alone or in-combination with other plans or projects on the River Avon SAC as a result of the Project. NE agreed with this conclusion which was finalised in its SoCG with the Applicant [REP8-031]. The Secretary of State agrees with this conclusion.

[44] http://publications.naturalengland.org.uk/publication/5156988124135424

5.9. Appropriate Assessment: Plymouth Sound and Estuaries SAC

Plymouth Sound and Estuaries SAC covers an area of 6,402.03 ha and is located approximately 229 km from the Project. Situated on the south-west coast, the site includes rias of the rivers Tavy, Tamar, Lynher and Yealm. The Plymouth Sound complex contains a high diversity of habitats and communities characteristic of different salinities. Notable habitats include intertidal and subtidal limestone reefs, offshore subtidal tide-swept reefs, tide-swept limestone channels, and subtidal sediments. The site is one of the chief rocky-shore strongholds for shore dock *Rumex rupestris* on the UK mainland.

The SAC is designated under article 4(4) of the Habitats Directive (92/43/EEC) as it hosts the following Annex I habitats: Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), estuaries, large shallow inlets and bays, mudflats and sandflats not covered by seawater at low tide, reefs, and sandbanks which are slightly covered by sea water all the time.

The site is also designated under article 4(4) of the Habitats Directive as it supports the Annex II species Allis shad and shore dock[45].

Site-specific supplementary advice on conservation objectives was available for the Plymouth Sound and Estuaries SAC. Table 9 lists attributes which were considered to be equivalent to those impacts for which a LSE could not be excluded.

Table 9: Supplementary advice attributes assessed for the Plymouth Sound and Estuaries SAC.

Feature	Impact for which LSE could not be excluded	Equivalent supplementary advice attribute
Allis shad	Pollution events	Population: recruitment and reproductive capability Structure and function: biological connectivity Supporting habitat: food availability Supporting processes: water quality - contaminants

5.9.1. Pollution events: Alone and in-combination

A LSE from potential pollution events could not be excluded for the allis shad feature of the site as the species are sensitive to pollution and have a preference for surface waters. There is evidence that allis shad return to their natal river to spawn and show high site fidelity[46] [47]. The Applicant therefore considered it likely that individuals would return to the SAC to spawn, with potential impacts occurring whilst they are migrating to or from their natal rivers.

The Applicant concluded that with the implementation of routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols, the likelihood of pollution events occurring would be reduced to as low as is reasonably practicable. These

[45] http://publications.naturalengland.org.uk/publication/5833129793159168

[46] Martin, J., Rougemont, Q., Drouineau, H., Launey, S., Jatteau, P., Bareille, G., Berail, S., Pécheyran, C., Feunteun, E., Roques, S., Clavé, D., García, D. J., Antunes, C., Mota, M., Réveillac, E., Daverat, F. (2015). Dispersal capacities of anadromous Allis shad population inferred from a coupled genetic and otolith approach. *Canadian Journal of Fisheries and Aquatic Sciences*. 72. 150312143907007. 10.1139/cjfas-2014-0510.

[47] Quignard., J. P., Douchement, C. (1991). *Alosa alosa* (Linnaeus 1758). In: Hoestlandt H (ed). The Freshwater fishes of Europe.Volume 2. *Clupeidae Anguillidae*. AULA-Verlag,Wiesbaden, pp. 86–126.

procedures are described in the Outline Marine CEMP [APP-488] which will be secured through the dML as part of the Recommended DCO. The measures are summarised in Section 5.1.2.2.

The Applicant considered the scale and nature of other plans and projects in the in-combination assessment and highlighted that the requirement for other plans and projects to adhere to similar best practice measures.

The Applicant concluded that there would be no AEoI on Plymouth Sound and Estuaries SAC alone or in-combination with other plans or projects as a result of the Project. This conclusion was not disputed by any Interested Party. NE stated in its RR that AEoI on the site resulting from the Project could be excluded beyond reasonable scientific doubt [RR-181]. This was agreed and finalised in its final SoCG [REP8-031]. The Secretary of State agrees with this conclusion.

5.10. Appropriate Assessment: Solent Maritime SAC

The Solent Maritime SAC covers an area of 11,325.09 ha and encompasses a major estuarine system on the south coast of England with four coastal plain estuaries (Yar, Medina, King's Quay Shore, Hamble) and four bar-built estuaries (Newtown Harbour, Beaulieu, Langstone Harbour, Chichester Harbour). The Solent and its inlets are unique in Britain and Europe for their hydrodynamic regime with their double tides and for the complexity of the marine and estuarine habitats present within the area. The site lies immediately east of the Project and overlaps with the marine cable corridor for approximately 163.4 m^2.

The site is designated under article 4(4) of the Habitats Directive (92/43/EEC) as it supports the following Annex I habitats: annual vegetation of drift lines, Atlantic salt meadows, coastal lagoons, *Spartina* swards, estuaries, mudflats and sandflats not covered by seawater at low tide, perennial vegetation of stony banks, *Salicornia* and other annuals colonising mud and sand, sandbanks which are slightly covered by seawater all the time, and shifting dunes along the shoreline with *Ammophila arenaria*.

The site is also designated under the same article as it hosts the Annex II species Desmoulin's whorl snail[48].

The following Annex I habitats were screened into the AA: estuaries, sandbanks which are slightly covered by seawater all the time, mudflats and sandflats not covered by sea water at low tide, *Spartina* swards, and *Salicornia* and other annuals colonising mud and sand.

Site-specific supplementary advice on conservation objectives was available for the Solent Maritime SAC. Table 10 lists attributes which were considered to be equivalent to those impacts for which a LSE could not be excluded.

Table 10: Supplementary advice attributes assessed for Solent Maritime SAC.

Feature	Impact for which LSE could not be excluded	Equivalent supplementary advice attribute
Estuaries	Increased SSC Deposition of sediment (smothering)	Supporting processes: water quality – DO Supporting processes: water quality – nutrients Supporting processes: water quality – turbidity Distribution: presence and spatial distribution of biological communities Extent and distribution

[48] http://publications.naturalengland.org.uk/publication/5762436174970880

		Structure: species composition of component communities Structure: substrate composition and distribution (deposition of sediment only)
Sandbanks which are slightly covered by seawater all the time	Increased SSC Deposition of sediment (smothering)	Supporting processes: sediment movement and hydrodynamic regime Supporting processes: water quality – DO Supporting processes: water quality – nutrients Supporting processes: water quality – turbidity Distribution: presence and spatial distribution of biological communities Extent and distribution Structure: species composition of component communities Structure: sediment composition and distribution (deposition of sediment only)
Mudflats and sandflats not covered by sea water at low tide	Increased SSC Deposition of sediment (smothering)	Supporting processes: sediment movement and hydrodynamic regime (deposition of sediment only) Supporting processes: water quality – DO (increased SSC only) Supporting processes: water quality – nutrients (increased SSC only) Supporting processes: water quality – turbidity (increased SSC only) Distribution: presence and spatial distribution of biological communities Extent and distribution Structure: species composition of component communities
Spartina swards *Salicornia* and other annuals colonising mud and sand	Increased SSC Deposition of sediment (smothering)	Supporting processes: sedimentary processes Distribution of the feature, including associated transitional habitats, within the site Extent of the feature within the site Future extent of habitat within the site and ability to respond to seasonal changes Structure and function (including its typical species): key structural, influential and distinctive species Structure and function: sediment size and availability Supporting processes: functional connectivity with wider coastal sedimentary system
	Pollution	Supporting processes: water quality

	Invasive species	Structure and function: vegetation – undesirable species
Estuaries Mudflats and sandflats not covered by seawater at low tide Sandbanks which are slightly covered by seawater all the time	Pollution	Supporting processes: sediment contaminants Supporting processes: water quality – contaminants
	Invasive species	Structure: non-native species and pathogens

5.10.1. Annex I habitats: Alone and in-combination

5.10.1.1. Invasive non-native species

As the Project will increase local traffic, disturb the seabed, and introduce new hard substrate, the potential for the introduction and spread of invasive non-native species (INNS) could not be excluded as a LSE on Annex I habitats of the site. The HRA Report highlighted that several INNS were known to be present in the marine cable corridor, such as the slipper limpet (*Crepidula fornicate*), Pacific oyster (*Magallana gigas*), Chinese mitten crabs (*Eriocheir sinensis*), wire weed (*Sargassum muticum*), and the leathery sea squirt (*Styela clava*)[49] [50].

The Applicant proposed that a Biosecurity Plan (as required under the dML) would be developed and approved for the Project post-consent. Further information on the practices are described in the Outline Marine CEMP [APP-488] and secured through the dML. These practices are summarised as follows:

- Vessels contracted to work on the Project will be required to follow current UK Guidance on ballast water management;
- Vessels will also be required to comply with the IMO 1997 guidelines "Guidelines for the Control and Management of Ships' Ballast Water to Minimise the Transfer of Harmful Aquatic Organisms and Pathogens". In particular, when loading, discharging or exchanging ballast, the vessel will be required to comply with section 9 of the "*Guidelines for the control and management of ships' ballast water to minimise the transfer of harmful aquatic organisms and pathogens*";
- Vessels contracted to work on the Project for any purpose will be required to follow current UK Guidance on the use of hull anti-fouling systems; and
- All vessels working on the Project shall ensure all practical steps are taken to ensure equipment proposed for use on the Project is not fouled by marine organisms.

The Applicant determined that through application of best practice plans and procedures by all vessels and contractors, this would reduce the potential introduction of INNS as far as reasonably practicable.

The Applicant's in-combination assessment highlighted the lack of predicted effects related to INNS from the Project alone, along with the requirement for other plans and projects to adhere to similar best practice measures.

5.10.1.2.Pollution

Impacts resulting from unplanned oil or chemical spills could occur at all phases of the Project. The accidental or deliberate release of marine litter could also impact upon features of the site. The Applicant concluded that with the implementation of routine mitigation measures of standard best practice in terms

[49] Eno, N.C., Clark, R.A. and Sanderson, W.G. (1997) Non-native marine species in British waters: a review and directory. JNCC, Peterborough. ISBN 1 86107 442 5.

[50] GB Non-Native Species Secretariat. (2019) GB Non-native species information portal. Available at: http://www.nonnativespecies.org/factsheet/index.cfm.

of waste management, pollution prevention measures and strict navigational protocols, these events would be prevented from occurring. These procedures are described in the Outline Marine CEMP [APP-488] which will be secured through the dML as part of the Recommended DCO. The measures are summarised in Section 5.1.2.2.

The in-combination assessment took the scale and nature of other plans and projects with temporal and spatial overlap into account and noted their requirement to adhere to similar best practice measures.

5.10.1.3. Increased SSC

The dredge disposal area will be located beyond KP21. Outputs of sediment plume dispersal modelling indicate that there would be no connectivity for increased SSC/sediment plumes within the SAC at this distance. The activities most likely to lead to increased SSC were determined to be excavation at the HDD pits and cable installation.

Within 2 km of the trench cable or HDD pit, peak SSCs of up to 200 mg/L are predicted which could persist for up to several hours following completion of works. Sediment plumes are likely to be transported up to 5 km away from the source at which point concentrations of 5 – 10 mg/L are predicted. Following completion of construction activities, SSC is expected to return to baseline levels within a few days. Fine sediments are likely to be transported up to 6 – 10 km in the nearshore area but with low SSCs at these distances (<5 mg/L). As natural variation in coastal areas ranges from approximately <5 to 75 mg/L in coastal areas and annual averages are between 5 – 15 mg/L within surface waters, increased SSC resulting from the Project was determined not be discernible. The mouth of the Langstone Harbour is approximately 1 km from the proposed HDD entry/exit points. SSC variability in the harbour is high and suspended sediments have been measured at 200 mg/L[51]. Peak SSC levels resulting from the Project will therefore not exceed natural levels of variation.

The HRA Report highlighted that estuarine habitats present within the SAC are considered highly tolerant to increased SSC. Following completion of activities, negligible effects are predicted on natural levels of turbidity, dissolved oxygen (“DO”) and nutrients. Areas of estuarine habitat which support Salicornia and other annuals colonising mud and sand are situated over 2 km from the closest marine activity. This feature is therefore not expected to be affected by increased SSC resulting from the Project. Saltmarsh plants are also tolerant of increased SSC. Light attenuation would be reduced through increased turbidity during construction works, however saltmarsh plants photosynthesise at low tide so would not be affected. Species covered by high tide would experience reduced photosynthesis but will be able to compensate when exposed to air at low tides[52]. Once activities cease, no effect on natural turbidity is predicted with negligible effects on sediment composition and the ability of features to transition or fluctuate. The Applicant noted that mudflat and sandflat habitats are not sensitive or have low sensitivity to increases in SSC. The variation in SSC predicted from the Project will be similar to natural variation already experienced and therefore no adverse effect on species composition or distribution associated with mudflat, sandflat and sandbank habitats is anticipated.

With regards to the in-combination assessment, the Applicant noted the lack of sensitivity to the impact from the Annex I habitats assessed. It also noted that all other activities which may result in in-combination effects were likely to be similar or less in extent and magnitude.

5.10.1.4.Deposition of sediment

The dredge disposal area will be located beyond KP21. Sediment plume dispersal modelling indicted that no sediment deposition is predicted within the SAC. Deposition from other cable installation activities is

[51] Humby, E. J., Dunn, J. N. (1975) Sedimentary Processes within Estuaries and Tidal Inlets, in: P.R. Helliwell and J. Bossanyi (Eds.) *Pollution Criteria for Estuaries,* London: Pentech Press, 87-99.

[52] Tyler-Walters, H., 2004. [Puccinellia maritima] salt-marsh community. In Tyler-Walters H. and Hiscock K. (eds) Marine Life Information Network: Biology and Sensitivity Key Information Reviews. Plymouth: Marine Biological Association of the United Kingdom. Available from: https://www.marlin.ac.uk/habitats/detail/350

not predicted to be significant as any coarse material mobilised would deposit rapidly. Finer sediment would be dispersed across a larger spatial extent. As there would be significant dispersal of fine sediment and low volumes of sediment are likely to be liberated into the water column, the Applicant considered there to be no discernible impacts from deposition.

The estuarine and saltmarsh habitats at their closest point to the proposed HDD entry/exit points are approximately 1 km from the entrance and considered to be outside of the area where the majority of sediment will be deposited. Most estuarine habitats are not sensitive to the effects of sediment deposition at the levels expected from the Project. Any deposition is expected to be light and temporary in nature, and likely to be within the natural variation of the sediment regime in the area. Saltmarsh plants, particularly pioneer species, are adapted to accreting environments and likely to not be adversely affected by smothering events for up to a month[53].

The impact of sediment deposition on *Spartina* swards was considered to be very small and localised as a result of the Project alone. For all other Annex I habitats assessed, the impact was considered indiscernible. The in-combination assessment noted that all other activities which may result in in-combination effects are likely to be similar or lesser in extent and magnitude.

5.10.2. Conclusions

The conclusions put forward in the HRA Report of no AEoI on the Solent Maritime SAC alone or in-combination with other plans or projects were not disputed by any Interested Party. In its RR, NE stated it was satisfied it could be excluded beyond reasonable scientific doubt that the Project would not have an AEoI on the site [RR-181]. This was agreed and finalised in their final SoCG [REP8-031]. The Secretary of State agrees with this conclusion.

5.11. Appropriate Assessment: South Wight Maritime SAC

The South Wight Maritime SAC covers 19,862.71 ha and contains mobile soft cliffs, semi-stable soft cliffs and Cretaceous hard cliffs. High chalk cliffs with species-rich calcareous grassland vegetation are found in the western and eastern extremities of the site. The site joins with the Isle of Wight Downs SAC at the western end, which provides an unusual combination of maritime and chalk grassland. Vegetation communities at the site are a mixture of acidic and mesotrophic grasslands with some scrub and a greater element of maritime species. The site lies 3.3 km west of the marine cable corridor.

The site is designated under article 4(4) of the Habitats Directive (92/43/EEC) as it supports the Annex I habitats submerged or partially submerged sea caves, reefs, and vegetated sea cliffs of the Atlantic and Baltic coasts[54].

Site-specific supplementary advice on conservation objectives was available for the South Wight Maritime SAC. Table 11 lists attributes which were considered to be equivalent to those impacts for which a LSE could not be excluded.

Table 11: Supplementary advice attributes assessed for the South Wight Maritime SAC.

Feature	Impact for which LSE could not be excluded	Equivalent supplementary advice attribute
Reefs	Increased SSC Deposition of sediment (smothering)	Supporting processes: sedimentation rate

[53] Tyler-Walters, H., 2001. Saltmarsh (pioneer). In Tyler-Walters H. and Hiscock K. (eds) Marine Life Information Network: Biology and Sensitivity Key Information Reviews. Plymouth: Marine Biological Association of the United Kingdom. Available from: https://www.marlin.ac.uk/habitats/detail/25

[54] http://publications.naturalengland.org.uk/publication/6242150467502080

Submerged or partially submerged sea caves		Distribution: presence and spatial distribution of biological communities Extent and distribution Structure: species composition of component communities Structure: substrate composition and distribution Supporting processes: water quality – DO Supporting processes: water quality – nutrients Supporting processes: water quality – turbidity Structure: physical structure of rocky substrate (for reefs feature only)
	Pollution	Supporting processes: water quality – contaminants Supporting processes: sediment contaminants
	Invasive species	Structure: non-native species and pathogens

5.11.1. Reefs and Submerged or partially submerged sea caves: Alone and in-combination

5.11.1.1. INNS

The Applicant determined that the introduction of INNS would not impact on the integrity of the site through the observation of best practice plans and procedures which would be implemented through a Biosecurity Plan. This would be developed and approved for the Project post-consent. Further information on the proposed plan is described in the Outline Marine CEMP [APP-488]. This is summarised in Section 5.10.1.1.

The in-combination assessment highlighted the lack of predicted effects related to INNS from the Project alone, along with the requirement of other plans and projects with temporal and spatial overlap to adhere to similar best practice measures.

5.11.1.2. Pollution events

Impacts resulting from unplanned oil or chemical spills and the accidental or deliberate release of marine litter could adversely impact upon features of the site. The Applicant concluded that with the implementation of routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols, pollution events would be prevented from occurring. These procedures are described in the Outline Marine CEMP [APP-488] which will be secured through the dML as part of the Recommended DCO. The measures are summarised in Section 5.1.2.2.

The in-combination assessment took the scale and nature of other plans and projects with temporal and spatial overlap into account and noted their requirement to adhere to similar best practice measures.

5.11.1.3. Increased SSC

Sediment plume dispersion modelling indicated that there will be no connectivity from increased SSC with the SAC as the disposal of dredged material is restricted to beyond KP21. The activities most likely to lead to increased SSC in the Project area were considered to be excavation at the HDD pits and cable installation. Peaks of up to 200 mg/L are predicted within 2 km of the cable trench or HDD pit which could persist for several hours following completion of construction works. Sediment plumes are predicted to be transported up to 5 km where concentrations of SSC are estimated to be 5 to 10 mg/L. After a few

days, SSC concentrations are expected to return to background levels. Fine sediments could potentially be transported up to 6 – 10 km in the nearshore area but SSCs at these distances are expected to be low (<5 mg/L) and therefore not discernible above natural variation.

The Applicant noted that most habitats present within reef environments are not sensitive to increases in SSC. Those which are sensitive are considered tolerant of short-term isolated increases in SSC which would be experienced as a result of the Project. Due to the distance of the closest submerged or partially submerged sea cave feature to the Project, the Applicant considered this to be outside the area of increased SSC and any increase would not be discernible against natural background variation. The Applicant also considered the feature to not be sensitive or to have low sensitivity to increases in SSC. As the predicted levels of SSC are within natural background levels, no effects on turbidity or DO are predicted. No effects on the distribution or composition of communities associated with the features, or on levels of inorganic nitrogen, are expected.

The in-combination assessment noted the indiscernible effects predicted from the Project alone and the general lack of sensitivity to the impact for the features assessed. It noted that all other activities which may result in in-combination effects were likely to be similar or less in extent and magnitude.

5.11.1.4. Deposition of sediment

Sediment dispersal monitoring indicated that there would be no risk of deposition within the SAC as disposal of dredged material is restricted to beyond KP21. Deposition from other cable installation activities was not predicted to be significant. Coarser material is expected to deposit almost immediately, and finer sediment is predicted to disperse over a greater spatial extent. Due to the volume of sediment estimated to be mobilised in the water column and the significant dispersion of sediment, the Applicant considered the impact of deposition to be negligible as sediments would be quickly redistributed and resuspended through tidal flows.

The closest reef feature to the Project within the SAC is approximately 3.3 km from the proposed HDD entry/exit pits. The closest submerged or partially submerged sea caves feature within the SAC is approximately 10 km from the same area. Both features were considered to be outside the area where the majority of sediment would be deposited. The Applicant stated that the reef feature is not sensitive to effects of deposition at this level, and any deposition of sediment would be light and temporary in nature. Once activities have ceased, normal rates of deposition are expected to return and therefore no effects on community composition and distribution, or the availability or structural integrity of features are predicted.

The in-combination assessment determined that the potential impacts resulting from deposition are considered indiscernible from the Project alone and the potential effects from activities associated with other plans or projects were determined to be similar or lesser in extent and magnitude.

5.11.2. Conclusions

With consideration of the assessments, the HRA Report determined there would be no AEoI from the Project alone or in-combination from impacts related to the introduction of INNS, pollution events, increased SSC or sediment disposition. NE stated in its RR that it was satisfied it could be excluded beyond scientific reasonable doubt that the project would not have an AEoI on the site [RR-181]. This was agreed and finalised in the final SoCG between the Applicant and NE [REP8-031]. The Secretary of State agrees with this conclusion.

6. Habitats Regulations Assessment Overall Conclusions

The Secretary of State has carefully considered the information presented before and during the Examination, including the RIES, the ES, representations made by Interested Parties, and the ExA's report itself. He considered that the Project had the potential to have an LSE on 13 protected sites when considered alone and in-combination with other plans or projects. These sites are listed below:

- Solent and Dorset Coast SPA
- Chichester and Langstone Harbours SPA
- Chichester and Langstone Harbours Ramsar site
- Portsmouth Harbour SPA
- Portsmouth Harbour Ramsar site
- Solent and Southampton Water SPA
- Pagham Harbour SPA
- River Itchen SAC
- River Avon SAC
- River Axe SAC
- Plymouth Sound and Estuaries SAC
- Solent Maritime SAC
- South Wight Maritime SAC

The Applicant concluded that the Project would not adversely affect the integrity of any of the protected sites assessed, either alone or in-combination. This depended on the implementation of mitigation measures, including:

Marine environment

- Disposal of dredged material at the designated disposal site (located between KP21 and KP109), as described in the Outline Marine CEMP and secured through the dML;
- Standard best practice in relation to waste management and spill response, as described in the Outline Marine CEMP and secured through the dML;
- A Marine Pollution Contingency Plan to be developed and approved post-consent, as required under the dML; and
- A Biosecurity Plan to be developed and approved post-consent, as required under the dML.

Nearshore and onshore environment

- Use of HDD under Langstone Harbour and part of Milton Common;
- Standard best practice in relation to waste management and pollution prevention measures;
- Winter working principles to control construction work in or adjacent to the Chichester and Langstone Harbours SPA and the SWBGS sites;
- Screening around HDD compounds to avoid noise and visual disturbance; and
- Restoration measures for SWBGS sites affected by construction work.

All proposed mitigation measures for the nearshore and onshore environment are as described in the Onshore Outline CEMP and secured through Requirement 15 of the Recommended DCO.

The Secretary of State has now undertaken an Appropriate Assessment in respect of the conservation objectives of the sites to determine whether the Project, either alone or in-combination with other plans or projects, will result in an adverse effect on the integrity of the above sites.

The recommendation of the ExA is that [ExA: 8.6.1]: "*On the basis of the information relating to HRA before the Examination, including the controls set out in the Recommended DCO and the final agreement from Natural England and the Joint Nature Conservation Committee ([REP8-031] and [REP8-032]), the*

ExA can advise the Secretary of State that it is satisfied that the Proposed Development would have no AEoI, either alone or in-combination with other plans or projects, on any European site."

The Secretary of State concludes in line with the recommendation of the ExA, that, subject to the mitigation secured in the DCO, the effects of the Project, either alone or in-combination with other plans or projects, on the features of the aforementioned 13 protected sites, would not lead to an adverse effect on the integrity of these sites.

7. Transboundary Assessment

Given the potential for this Project to affect mobile features across a wide geographical area; the Secretary of State believes it important to consider the potential impacts on protected sites in other European Economic Area ("EEA") states, known as transboundary sites, in further detail. The ExA also considered the implications for these sites, in the context of looking at the wider EIA considerations. The results of the ExA's considerations and the Secretary of State's own views on this matter are presented below.

In April 2019, during the pre-application stage, the Planning Inspectorate undertook a transboundary screening on behalf of the Secretary of State [OD-001] to satisfy processes under EIA Regulation 32 and the United Nations Environment Programme Convention on Biological Diversity 1992.

Transboundary issues notification under Regulation 24 of the EIA Regulations was considered necessary for the following EEA States:

- Belgium;
- Denmark;
- France;
- Spain; and
- The Netherlands.

All were notified in April 2019, and a notice was placed in the London Gazette on 15 April 2019. Of the countries notified, only Spain registered as an IP to the Examination. No further correspondence was received in relation to transboundary issues.

Any further correspondence received in relation to transboundary issues will be passed to the Secretary of State who must have regard to transboundary considerations and to any responses made by any EEA State.

Potential transboundary impacts were considered in the HRA Report with several protected sites taken forward to the shadow AA.

The Secretary of State notes that the Applicant considered non-UK protected sites in its Application and it concluded that there would be no likely significant effect from the Project alone and in-combination for all non-UK protected sites. The ExA did not note any objections to this conclusion in its recommendation report.

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