AQUIND Limited

AQUIND INTERCONNECTOR

Habitats Regulations Assessment Report

The Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 - Regulation 5(2)(g)

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

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ABBREVIATIONS

Abbreviation	Term in full
AA	Appropriate Assessment
AC	Alternating Current
BAP	Biodiversity Action Plan
BERR	Department for Business Enterprise and Regulatory Reform
BoCC	Birds of Conservation Concern
BTO	British Trust for Ornithology
CBRA	Cable Burial Risk Assessment
CIEEM	Chartered Institute for Ecology and Environmental Management
CLV	Cable Lay Vessel
cSACs	Candidate Special Areas of Protection
DC	Direct Current
DCO	Development Consent Order
DO	dissolved oxygen
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EMV	Excavator Mounted Vibrator
ES	Environmental Statement

Abbreviation	Term in full
ESCP	East Solent Coastal Partnership
EU	European Union
GIS	Geographical Information Systems
HDD	Horizontal Directional Drilling
HRA	Habitats Regulations Assessment
HV	High Voltage
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
ICES	International Council for Exploration at Sea
ICOL	Inchcape Offshore Limited
IMO	International Maritime Organisation
INIS	Invasive Non-Indigenous Species
IQI	Infaunal Quality Index
IROPI	Imperative Reasons of Overriding Public Interest
ISM	International Safety Management
JNCC	Joint Nature Conservation Committee
KP	Kilometre Point
LNR	Local Nature Reserve
LPA	Local Planning Authority
LSE	Likely Significant Effect

Abbreviation	Term in full
LWS	Local Wildlife Site
MCZ	Marine Conversation Zone
MFE	Mass Flow Excavation
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
MW	Megawatts
NG	National Grid
nmi	Nautical miles
nmi^2	Nautical miles squared
NOAA	National Oceanic and Atmospheric Administration
NPPF	National Planning Policy Framework
NSIP	Nationally Significant Infrastructure Project
OOS	Out of Service
OSPAR	Oslo and Paris Conventions
OWF	Offshore Wind Farm
PA	Planning Act
PAH	Pesticides and Polycyclic Hydrocarbons
PCC	Portsmouth City Council
PCI	Project of Common Interest

Abbreviation	Term in full
PINS	Planning Inspectorate
PLGR	pre-lay grapnel run
PTS	permanent threshold shift
RSPB	Royal Society for the Protection of Birds
RTE	Réseau de Transport d'Électricité
SACs	Special Areas of Conservation
SACO	Supplementary Advice on Conservation Objectives
SAMM	Suivi Aérien de la Mégafaune
SCANS	Small Cetaceans in European Atlantic Waters and the North Sea
SCIs	Sites of Community Importance
SEL	sound exposure level
SINC	Site of Importance for Nature Conservation
SNCB	Statutory National Conservation Body
SNH	Scottish Natural Heritage
SoCG	Statement of Common Ground
SPAs	Special Protection Areas
SPL	Sound Pressure Level
SSC	Suspended Sediment Concentrations
SWBGS	Solent Waders and Brent Goose Strategy

Abbreviation	Term in full
TJB	Transition Joint Bay
TOC	Total Organic Carbon
TSHD	Trailing Suction Hopper Dredger
UK	United Kingdom
VSC	Voltage Source Converter
WeBS	Wetland Bird Survey
WFD	Water Framework Directive
WSP	WSP Parsons Brickerhoff
ZOI	Zone of Influence
ZSC	Zone Spéciale de Conservation

EXECUTIVE SUMMARY

This Habitats Regulations Assessment Report addresses the requirements, in respect of the AQUIND Interconnector (the Proposed Development), under regulation 5(2)(g) of The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 to provide information that will be required by the Competent Authority to enable it to undertake an Habitats Regulations Assessment ('HRA') Screening to determine whether an Appropriate Assessment ('AA') is required, and where one is required, to undertake an AA in accordance with Regulation 63(2) of the Habitats Regulations and 28(3) of the Offshore Habitats Regulations.

AQUIND Interconnector (the 'Project') consists of the construction of a 2,000 MW bi-directional electrical power transmission link between the South Coast of England and Normandy in France and would facilitate the import and export of electricity between the UK and France. The Proposed Development includes that part of the Project located within the UK and the UK Marine Area, for which development consent is sought by the Application.

This assessment – and the Environmental Impact Assessment ('EIA') – uses the Rochdale Envelope approach to consider a range of maximum worst case design parameters for each of the main receptor groups (marine mammals, migratory fish, Annex I habitats and passage/wintering/breeding birds) considered to be potentially impacted by the Proposed Development.

For onshore assessments, the study area includes the onshore and intertidal areas adjacent to the Order limits of the Proposed Development onshore, with all European sites within 10 km considered. Surveys for onshore and intertidal breeding and wintering birds were undertaken within a 500 m buffer from the Proposed Developments's Order Limits.

For the marine assessments, the study areas are receptor specific ranging from the marine area around the Proposed Development, the wider Channel, the UK and French marine areas and rivers that flow into the Channel for Annex I habitats, migratory fish and marine mammals and the mean-maximum foraging range and migratory range of breeding seabirds and passage/wintering seabirds.

Twenty designated sites (SAC, SPA, Ramsar) within the UK, France and Channel Islands were screened as sites for which there was potential for a likely significant effect as a result of the construction, operation and decommissioning of the Proposed Development alone and in combination with other projects and plans.

Following the consideration of likely significant effects, the potential for an adverse effect on the integrity of eleven UK designated sites (SACs and SPA/Ramsars) and eight French designated sites (SPAs, SACs) and a Ramsar in the Channel Islands was assessed for both the Proposed Development alone and in combination with other plans and projects. Effects considered included disturbance and displacement, indirect effects, and accidental spills and litter on ornithological features; pollution on Annex I habitats, migratory fish and marine mammal features; invasive species, sediment deposition, and increased suspended sediments on Annex I habitats; and increased suspended sediments on migratory fish features.

For the sites and features assessed, it has been concluded that the Proposed Development will not have an adverse effect on site integrity alone or in combination with other projects and plans.

Statutory Nature Conservation Bodies, the Planning Inspectorate and interested parties were consulted and commented on a draft version of this HRA Report. Those comments have been taken into account in producing this final revision of the HRA Report for the Proposed Development.

1. INTRODUCTION

1.1. PURPOSE OF THIS REPORT

1.1.1.1. This Habitats Regulations Assessment ('HRA') Report is submitted on behalf of AQUIND Limited (the 'Applicant') to accompany an application (the 'Application') for a Development Consent Order ('DCO') submitted to the Secretary of State ('SoS') for Business, Energy and Industrial Strategy ('BEIS'). The Applicant is a UK-registered company with the sole business of developing and operating AQUIND Interconnector. The application relates to the UK elements of AQUIND Interconnector which constitutes the Proposed Development.

1.1.1.2. This HRA Report provides information that will be required by the Competent Authority to enable it to undertake HRA Screening to determine whether an Appropriate Assessment ('AA') is required, and where one is required, to undertake an AA in accordance with regulation 63(2) of the Habitats Regulations and 28(3) of the Offshore Habitats Regulations. This HRA Report is also submitted in accordance with the requirements of regulation 5(2)(g) of the Infrastructure Planning (Applications: Prescribed Forms and Procedures) Regulation 2009.

1.2. PROJECT OVERVIEW

1.2.1.1. AQUIND Interconnector consists of the construction of a 2,000 MW bi-directional electrical power transmission link between the South Coast of England and Normandy in France and would facilitate the import and export of electricity between the UK and France, helping to meet the electricity needs of both countries (the "Project"). The Project will have the capacity to transmit 16,000,000 Mwh of electricity, which equates to 5% and 3% of the total consumption of the UK and France respectively. The indicative location of the project is shown in Plate 1.1.

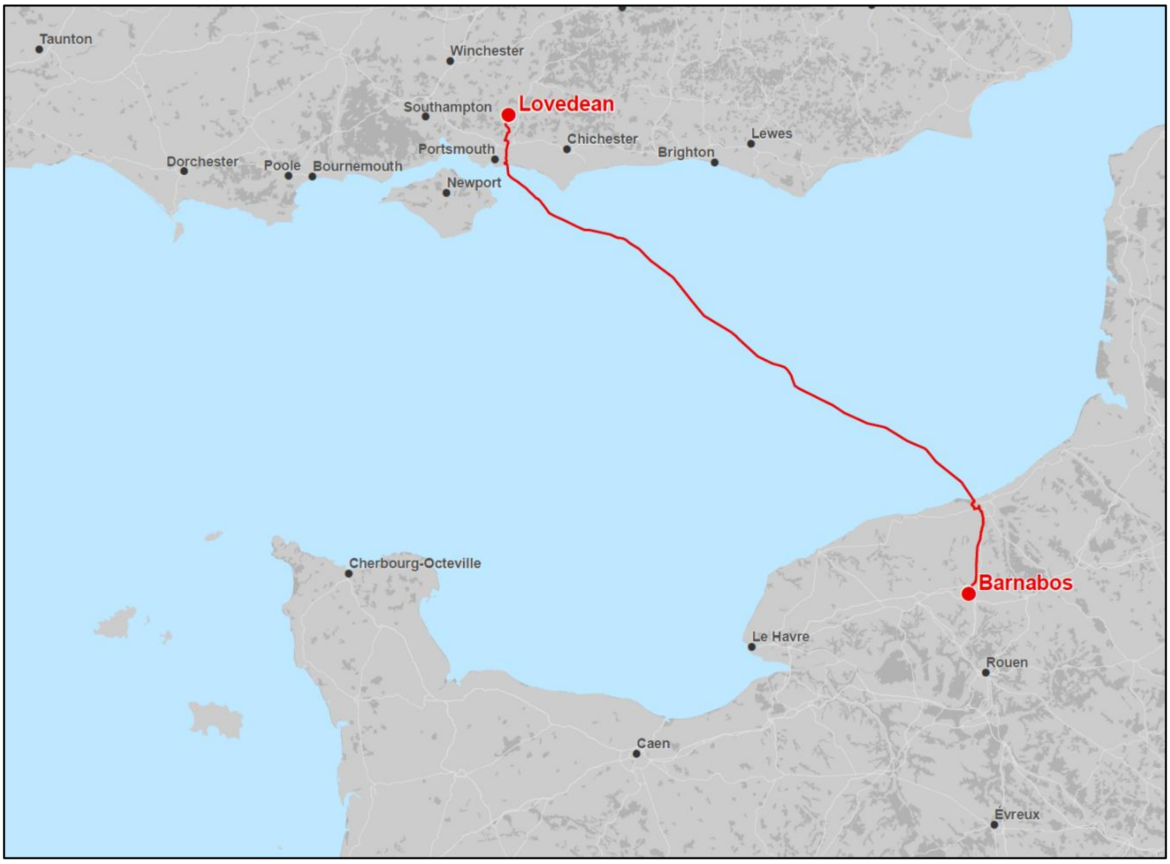

Plate 1.1 - AQUIND Interconnector between the UK and France – indicative location

1.2.1.2. The Proposed Development includes:

- Works at the existing Lovedean Substation in Hampshire to facilitate the connection of the Proposed Development to the National Electricity Transmission System ('NETS');
- Underground high voltage alternating current ('HVAC') Cables accompanied by a smaller diameter FOC, connecting Lovedean Substation to the proposed Converter Station;
  - A newly constructed Converter Station Area comprising
  - the Converter Station and associated equipment;
  - a Works Compound and Laydown Area;
  - an Access Road and associated haul roads;
  - surface water drainage and associated attenuation ponds;
  - landscape and ecology measures;
  - utilities such as potable water, electricity and telecoms; and

- the compound comprising the Telecommunications Building(s) and associated equipment.;

- Two pairs of underground Onshore HVDC Cables, each pair accompanied by a smaller diameter Fibre-Optic Cable ('FOC'), to run from the Converter Station to the Landfall site in Eastney (near Portsmouth), approximately 20 km in length;
- Infrastructure to join the Onshore and Marine HVDC Cables together at the Landfall, and two Optical Regeneration Stations ('ORS') (one for each circuit) housed in separate buildings; and
- Two pairs of Marine HVDC Cables, each pair accompanied by a smaller diameter FOC, to run from the Landfall site in Eastney to the boundary of the UK Exclusive Economic Zone ('EEZ').

1.2.1.3. Chapter 3 (Description of the Proposed Development) of the Environmental Statement ('ES') (APP-118)) contains a detailed description of the Proposed Development for which development consent is sought by the Applicant.

1.3. STRUCTURE AND CONTENTS OF THIS REPORT

1.3.1.1. This report has been written in partnership by Natural Power Consultants and WSP. Natural Power Consultants has undertaken the assessments that relate to the marine works of the Proposed Development and WSP has undertaken the assessments that relate to the onshore works.

1.3.1.2. This document comprises the following sections:

- The Habitats Regulations Assessment Process
- Project Description
- Environmental Baseline (Marine)
- Environmental Baseline (Onshore)
- Identification of European Sites and Potential Effects
- Determination of Likely Significant Effects ('LSEs')
- In combination Assessment
- Summary of LSEs
- Determination of Potential Adverse Effects (Marine)
- Determination of Potential Adverse Effects (Onshore)
- References

2. THE HABITATS REGULATIONS ASSESSMENT PROCESS

2.1. LEGISLATIVE CONTEXT

2.1.1.1. The Habitats Directive (92/43/EEC), on the conservation of natural habitats and of wild fauna and flora, protects habitats and species of European nature conservation importance. The Council Directive (2009/147/EC) on the conservation of wild birds (the 'Birds Directive') seeks to protect all wild birds and also sites important to the protection of wild birds. The Ramsar convention seeks to protect wetlands of international importance, under which the UK has to meet relevant obligations. Together the Habitats Directive, the Birds Directive and the Ramsar Convention establish a network of internationally important sites, designated for their ecological status.

2.1.1.2. Special Areas of Conservation ('SACs') are designated under the Habitats Directive and promote the protection of flora, fauna and habitats. Special Protection Areas ('SPAs') are designated under the Birds Directive in order to protect rare, vulnerable and migratory birds. These sites combine to create a Europe-wide 'Natura 2000' network of designated sites. Ramsar sites of wetland importance are protected by the Ramsar Convention.

2.1.1.3. Terrestrial areas of the UK and territorial waters out to 12 nautical miles ('nmi') are covered under The Conservation of Habitats and Species Regulations 2017 (herein referred to as the Habitats Regulations) which transpose the Habitats and Birds Directive. The Habitats Regulations protect 'European sites', which in accordance with regulation 8 of the Habitats Regulations comprise SACs, SPAs and Sites of Community Importance ('SCIs').

2.1.1.4. The Conservation of Offshore Marine Habitats and Species Regulations 2017 (the Offshore Habitats Regulations) transpose the Habitats and Birds Directives into national law, covering waters beyond 12 nmi, to the extent of the British Fishery Limits and UK Continental Shelf Designated Area. The Offshore Habitats Regulations protect 'European offshore marine sites', as that term is defined by regulation 18 of the Offshore Habitats Regulations.

2.1.1.5. In addition, UK Government policy (e.g. National Planning Policy Framework ('NPPF')) states that internationally important wetlands designated under the Ramsar Convention 1971 (Ramsar sites) are afforded the same protection as SPAs and SACs for the purpose of considering development proposals that may affect them.

The Government also affords the same level of protection to proposed SPAs (pSPAs) and candidate SACs ('cSACs') as for fully designated sites.

2.1.1.6. Under the Habitats Regulations and the Offshore Habitats Regulations, before granting approval (i.e. planning permissions, licenses and consents) for a development likely to have a significant effect on any protected site, an AA must be made by a Competent Authority of its implications for the site in view of that site's conservation objectives.

2.2. HABITATS REGULATIONS ASSESSMENT

2.2.1.1. The Habitats Regulations and Offshore Habitats Regulations require that wherever a project that is not directly connected to, or necessary for, the management of a European site or a European offshore marine site, as the case may be, is likely to have a significant effect on the conservation objectives of the site (directly, indirectly, alone or in combination with other plans or projects) an AA must be undertaken by the Competent Authority (Regulation 63 of the Habitats Regulations and Regulation 28 of the Offshore Habitats Regulations). The AA must be carried out before any consent or authorisation can be given for the project.

2.2.1.2. The Planning Inspectorate ('PINS') Advice Note Ten 'Habitat Regulations Assessment relevant to nationally significant infrastructure projects' (version 8, November 2017), defines the HRA process as a multi stage process that helps determine Likely Significant Effects ('LSE') and (where appropriate) assesses adverse effects on the integrity of a European site (or a European offshore marine site, as the case may be), examine alternative solutions, and provide justification for Imperative Reasons of Overriding Public Interest ('IROPI'). This constitutes a four-stage process as summarised below and illustrated in Plate 2.1.

- HRA Stage 1 - Screening: Screening for LSE (alone or in combination with other projects or plans);
- HRA Stage 2 - Appropriate Assessment: Assessment of implications of identified LSEs on the conservation objectives of a European site to ascertain if the proposal will adversely affect the integrity of a European site;
- HRA Stage 3 – Assessment of Alternative Solutions (where it cannot be ascertained that the proposal will not adversely affect the integrity of a European site); and
- HRA Stage 4 – Assessment of IROPI (where no alternative solutions are identified).

2.2.1.3. All four stages of the process are referred to as the Habitats Regulations Assessment (HRA), distinguishing the process as a whole from the one stage within it referred to as the "Appropriate Assessment" (AA).

2.2.1.4. The integrity of a site is the coherence of the site's ecological structure and function, across the whole of its area, which enables it to sustain the habitat, complex of habitats and/or populations of species for which the site has been designated[1].

2.2.1.5. 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 designation[2].

[1] European Communities (2000) Managing Natura 2000 sites - The provisions of Article 6 of the 'Habitats' Directive 92/43/CEE. EC

[2] English Nature, 1997 – Habitats Regulations Guidance Note.

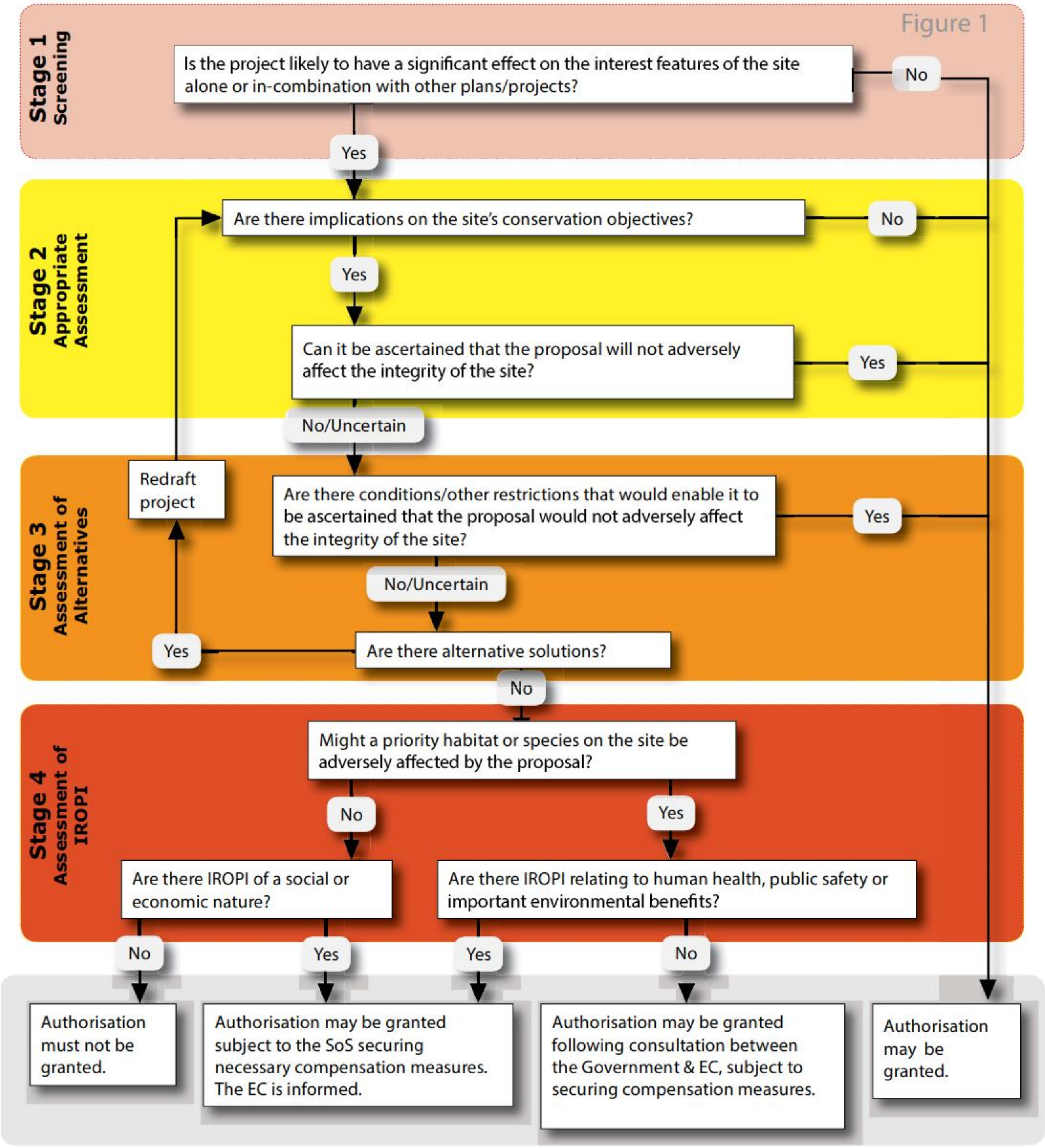

Plate 2.1 - Four Stage HRA Process (PINS, 2017)

2.3. APPROACH TO SCREENING

2.3.1.1. Screening is a relatively coarse filter to identify those sites and features for which LSE cannot be discounted. For the purposes of this report an initial pre LSE screening stage has been introduced into the process (see Section 6). This stage is essentially a site-identification / selection process, which, while it forms part of the overall LSE determination stage of HRA, has been separated out to refine the list of sites taken forward for a more detailed consideration of LSE in connection with the Proposed Development. Once a site/feature is identified, the screening exercise considers whether or not a likely significant effect can be foreseen, both directly and indirectly. A precautionary approach is followed, where it is not currently possible to exclude a LSE, then the site/feature is progressed to the AA Stage (Stage 2 of the HRA).

2.3.1.2. This precautionary approach has been taken in accordance with the PINS Note 05/2018[3], disregarding all measures that could be construed as being introduced to avoid or reduce an effect on a European site for the purpose of determining whether any LSEs arise in connection with the Proposed Development.

2.3.1.3. With respect to in combination effects, the plans and projects that have been considered have been agreed through discussion with local authorities, the Marine Management Organisation and Statutory Nature Conservation Bodies (SNCBs) who have identified specific projects for inclusion in the in combination assessment. The HRA Report includes, for those sites screened into further assessment, a detailed in combination assessment drawing on the environmental impact assessments (EIAs) (including cumulative assessment) undertaken specifically for relevant plans or projects to understand the magnitude of those effects and whether they may lead to an adverse effect on site integrity.

[3] PINS Note 05/2018, November 2018 – Consideration of avoidance and reduction measures in Habitats Regulations Assessment: People over Wind, Peter Sweetman v Coillte Teoranta.

2.4. CONSULTATION

2.4.1.1. AQUIND has taken a positive approach to pre-application consultation with the local community in the vicinity of the location of the Proposed Development and with all relevant stakeholders with the UK.

2.4.1.2. Preliminary meetings were held with Natural England on 6 and 13 February 2019 to discuss the onshore and marine environments respectively and the HRA required in connection with the Proposed Development. On 6 February WSP provided a presentation which included discussion on impacts on birds from onshore aspects of the Proposed Development including on SPAs and functionally linked habitat.

2.4.1.3. On 13 February, a Natural Power provided a presentation to direct the topics discussed during the meeting which included discussion on sites to be assessed for marine mammals, birds, migratory fish and benthic habitats in relation to the HRA Report.

2.4.1.4. Subsequent email communications with Natural England identified that litter and visual disturbance pressures needed to be assessed for tern species within the HRA (email received 13 March 2019). In addition, in July 2019 Natural England advised on the extent of Zones of Influence (ZOI) for marine ornithology;

"For the HRA, mean-max foraging ranges (Thaxter et al., 2012) will be used to assess whether any SPA birds are present within the ZOI for the cable route and other plans/projects. For the ES, a 10 km ZOI will be applied to the cable route for the purpose of screening other plans/projects (based on the understanding that disturbance/displacement can occur up to c.6 km from source). We are content with this difference in approach but have a couple of comments:

- *It should be noted that some of the data used in Thaxter et al., (2012) is now out of date, although this principally relates to auks, gulls, gannets and shags - rather than terns which would be the key species of concern for the HRA. We are aware that some subsequent Sandwich tern tracking work has been undertaken, but it may not be published yet - so it might be worth checking.*
- *Regarding the proposal to apply the ZOI for breeding birds to non-breeding birds, our only thought is to double-check that there are no non-breeding species which have ranges in excess of the breeding bird ranges. Providing this can be confirmed, then the approach sounds suitable*."

2.4.1.5. Subsequent to the February 2019 meeting, Natural Power also produced and submitted a short consultation document to Natural England (on 2 April 2019) which provided evidence and rationale for the approach taken for pre-screening a number of SACs that possess marine mammal features such that they would not need any further assessment within the HRA.

2.4.1.6. This document was passed to the Natural England marine mammal specialist who responded on the 3 May 2019 by stating;

"*The document clearly sets out the rationale for assessing potential connectivity with the four UK marine mammal SACs, concluding that potential impacts upon each of these sites can be screened out. We welcome this additional information and agree with the document's conclusions. Our only comment is to ensure that this information is included in the ES/HRA Report (an appendix would be fine) for the purposes of the audit trail*."

2.4.1.7. Information detailing the approach and outcomes of the pre-screening of SACS for which marine mammals are features is provided in Appendix 2 of this Report (APP-502).

2.4.1.8. The Project will cross between two Member States which are the UK and France. It was included on the third Project of Common Interest list in March 2018, and has also therefore complied with the requirements of the Regulation on guidelines for trans-European energy infrastructure (EU 347/2013) (the Ten-E Regulations) in relation to consultation carried out both in the UK and in France.

2.4.1.9. On 2 April 2019, PINS issued a Transboundary Impacts Screening Matrix in accordance with regulation 32 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the "EIA Regulations"), notifying France, Spain, the Netherlands, Belgium, Denmark and Germany that in their view the Proposed Development is likely to have a significant effect on the environment in another EEA State, having taking a precautionary approach and the information provided by the Applicant in their request for an EIA scoping opinion. Spain confirmed they wished to participate in the EIA procedure for examining the DCO application as an interested party. Germany and Denmark confirmed they did not intend to participate in the EIA procedure. Belgium, France and the Netherlands did not respond to the notification provided to them by PINS. Is should be noted that the Secretary of State's duty under regulation 32 of the EIA Regulations continues throughout the application process.

2.4.1.10. Natural Power consulted with Natural England, Joint Nature Conservation Committee ('JNCC'), and the Environment Agency on the draft HRA Report in September 2019. The comments received and how they have been considered are detailed in Appendix 4 (Marine Consultation Responses) (APP-504).

2.4.1.11. Natural Power also sent a draft copy of this HRA Report to the Alderney Wildlife Trust who acts on behalf of the States of Alderney as administrators for designated sites (see details of their response in Appendix 4). Natural Power also sent a summary of this report to French authorities (Direction régionale de l'Environnement, de l'Aménagement et du Logement) outlining the potential for LSEs on French designated sites.

3. DESCRIPTION OF THE PROPOSED DEVELOPMENT

3.1. INTRODUCTION

3.1.1.1. AQUIND Interconnector (the Project) comprises a new marine and onshore High Voltage Direct Current ('HVDC') power cable transmission link between Normandy in France and Eastney, Hampshire, converter stations in both England and France and infrastructure necessary to facilitate the import and export of electricity between both countries (see Plate 3.1).

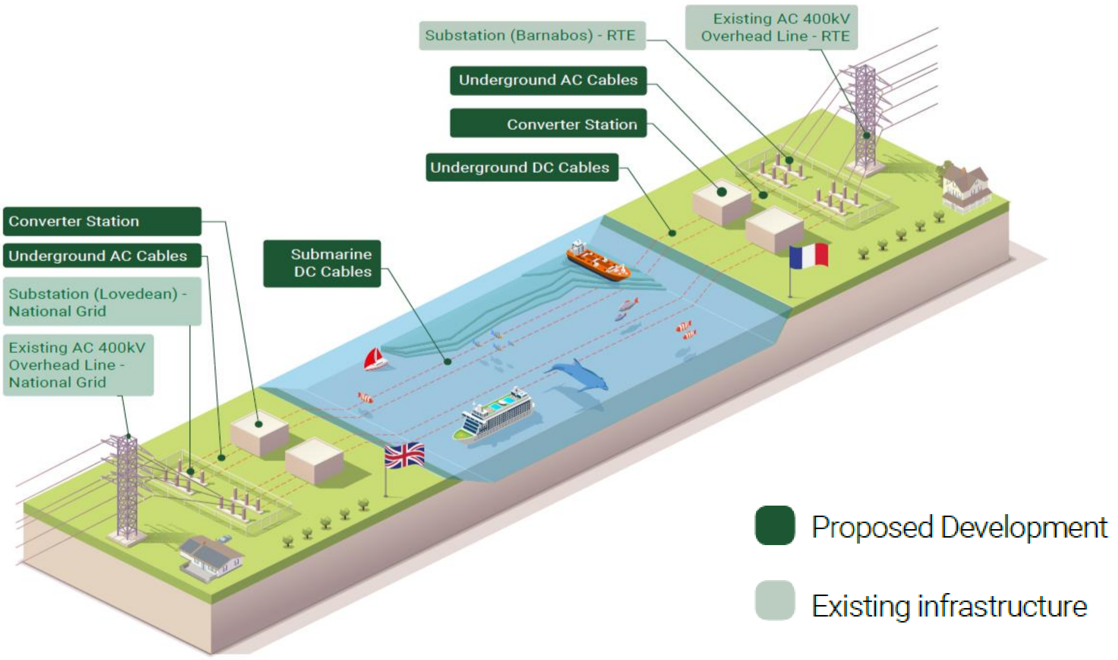

Plate 3.1 - The main elements of AQUIND Interconnector

3.1.1.2. The purpose of the Project is to make a significant contribution towards increasing the cross-border capacity between the UK and France (providing a net capacity of 2,000 megawatts ('MW')). Increasing cross border capacity, through the provision of interconnectors, improves competition in energy markets, delivers security and flexibility of energy supply in both countries as well as helping to fight climate change by integrating more renewable energy sources like solar and wind.

3.1.1.3. The Project will be approximately 238 km in length and comprise the following Marine and Onshore Components in France and UK (see Plate 3.1):

- Marine HVDC Cables;
- Onshore HVDC Cables;
- Converter Stations;
- HVAC Cables;
- FOC and FOC Infrastructure, and
- other associated infrastructure.

3.1.1.4. The French and UK elements of the Project require different consents and licences within the respective jurisdictions. It should be noted that a separate assessment in accordance with the Habitats Directive and the Birds Directive in connection to the French elements of the Project has been undertaken to inform the French consenting process.

3.2. THE PROPOSED DEVELOPMENT

3.2.1.1. The Proposed Development includes that part of the Project located within the UK and the UK Marine Area, for which development consent is sought by the DCO Application.

3.2.1.2. The Proposed Development is broadly comprised of the Marine Components and the Onshore Components.

3.2.2. MARINE COMPONENTS

3.2.2.1. The marine elements will comprise four submarine cables between the UK and France, which can be bundled in pairs, together with smaller diameter fibre optics cables. The Marine Cable Route can be divided into the following sections:

- Approximately 45 km within the UK territorial limit, i.e. 12 nmi from shore;
- Approximately 64 km from the UK territorial limit to the boundary of the Exclusive Economic Zone ('EEZ');
- Approximately 44 km from the boundary of the EEZ to the French territorial limit; and
- Approximately 29 km within the French territorial limit, i.e. 12 nmi from shore.

3.2.2.2. The full project description is provided in Chapter 3 (Description of the Proposed Development) of the Environmental Statement ('ES'). A summary of the project description is described below in order to provide an overview of the Proposed Development and context to the HRA.

3.2.2.3. More detailed design envelope scenarios assessed per receptor group are presented within the relevant ES Chapters as follows:

- Chapter 8: Intertidal and Benthic Ecology Habitats;
- Chapter 9: Fish and Shellfish;
- Chapter 10: Marine Mammals and Basking Sharks; and
- Chapter 11: Marine Ornithology.

3.2.2.4. Important to note is a key difference between the design parameters used for the Stage 1 HRA assessment (LSE screening in Sections 6 and 7 of this document) and the ES assessments, in order to reflect the European Court of Justice ('ECJ') decision People Over Wind, Peter Sweetman v Coillte Teoranta (C-323/17) (April 2018) which adjudged that mitigation should not be applied at LSE screening stage but as part of the AA stage.

3.2.2.5. The ES design envelope includes the requirement for the disposal of dredge material (potentially required as a result of sandwave clearance), within the proposed marine disposal area which is located within the Marine Cable Corridor between Kilometre Point ('KP') 21 and KP 109 (see Plate 3-2 below).

3.2.2.6. While the rationale for avoiding sediment disposal within the nearshore (landward of KP 21) was to reduce possible effects on water quality including Water Framework Directive ('WFD') waterbodies more broadly (rather than mitigating specific HRA effects), it is considered prudent to treat this approach as mitigation for HRA purposes.

3.2.2.7. Accordingly, the ZOI for identifying possible Annex I habitat SACs (Section 6) and for undertaking the LSE assessment (Section 7) uses a 25 km distance which is based upon sediment plumes from disposal taking place anywhere within the Marine Cable Corridor. The requirement for disposal activities to take place within the designated marine disposal area (between KP 21 and KP 109) is applied as mitigation at the AA stage (see Section 10.2.5 for further details) subject to the formal designation of the proposed marine disposal site.

3.2.3. ONSHORE COMPONENTS

3.2.3.1. In the UK, the following Onshore Components of the Proposed Development are proposed:

- Works at the existing National Grid Lovedean substation in Hampshire to facilitate the connection of the Project to the existing Great Britain electrical power transmission network, the National Grid;

- Underground high voltage alternating current (HVAC) cables, connecting the National Grid Lovedean substation to the proposed Converter Station;
- A newly constructed Converter Station Area comprising:
  - the Converter Station and associated equipment;
  - a Works Compound and Laydown Area;
  - an Access Road and associated haul roads;
  - surface water drainage and associated attenuation ponds;
  - landscape and ecology measures;
  - utilities such as potable water, electricity and telecoms; and
  - the compound comprising the Telecommunications Building(s) and associated equipment.;
- Two pairs of underground HVDC cables, each of which is paired with a smaller diameter fibre optic cables for data transmission, to run from the Converter Station to the Landfall site in Eastney (near Portsmouth), approximately 20 km in length (each); and
- Infrastructure to join the onshore and marine HVDC cables together at the Landfall, and two Optical Regeneration Stations ('ORS') (one for each circuit) housed in separate buildings.

3.2.3.2. The full description of the Proposed Development is provided in Chapter 3 (Description of the Proposed Development) of the Environmental Statement (ES). A summary of this is included in Section 3.2 of this document in order to provide an overview of the Proposed Development and context to the HRA.

3.2.3.3. More detailed design envelope scenarios assessed per receptor group are presented within Chapter 16 of the ES: Onshore Ecology.

3.3. MARINE INFRASTRUCTURE

3.3.1.1. The Marine Cable Corridor is the corridor encompassing the marine geophysical, benthic and geotechnical survey areas (as shown in Plate 3.2) and is approximately 109 km long. This is 500 m wide from KP 0 to KP 8.6, then 520 m wide from KP 8.6 to the UK/France EEZ Boundary Line. The Marine Cable Corridor is also extended to include a 1,500 m diameter centred on the Atlantic Crossing cable crossing at approximately KP 72.5.

3.3.1.2. At the Landfall the ducts will be installed by Horizontal Directional Drilling ('HDD'). HDD can be used to allow cables to cross under certain constraints along the route namely water ways, railways and environmentally sensitive areas. HDD methodology will also be used to install the Marine Cables under the intertidal area. It is not determined yet whether the HDD direction will be onshore to marine, marine to onshore, or drilling from both ends. However, all assessments have considered that drilling from offshore to onshore would represent worst case. The HDD entry/exit pit locations will be located between KP 1 and KP 1.6 shown in Plate 3.2 and the majority of works will be undertaken from a jack up vessel. The use of HDD avoids the need for any trenching operations on Eastney Beach or in the nearshore area.

3.3.1.3. HDD works will include use of a vibro-hammer (typically an excavator mounted vibrator ('EMV')) to install up to four trestles/lattice frameworks which will be required to support steel casings. Vibration methods are non-percussive. A pipe driving machine (also known as a hydraulic ram) will also be used to install up to four 36" diameter steel casing pipes/casings which will be required for HDD of each duct. Pipe driving machines also use vibration in order to push in/install casing pipes with an auger inside which removes the sediment.

3.3.1.4. The Marine Cable Route will be the final route for the cable that lies within the Marine Cable Corridor, comprising two HVDC cable circuits typically 50 m apart.

3.3.1.5. The indicative programme for construction activities for assessments runs from mid-2021 through to the end of 2023.

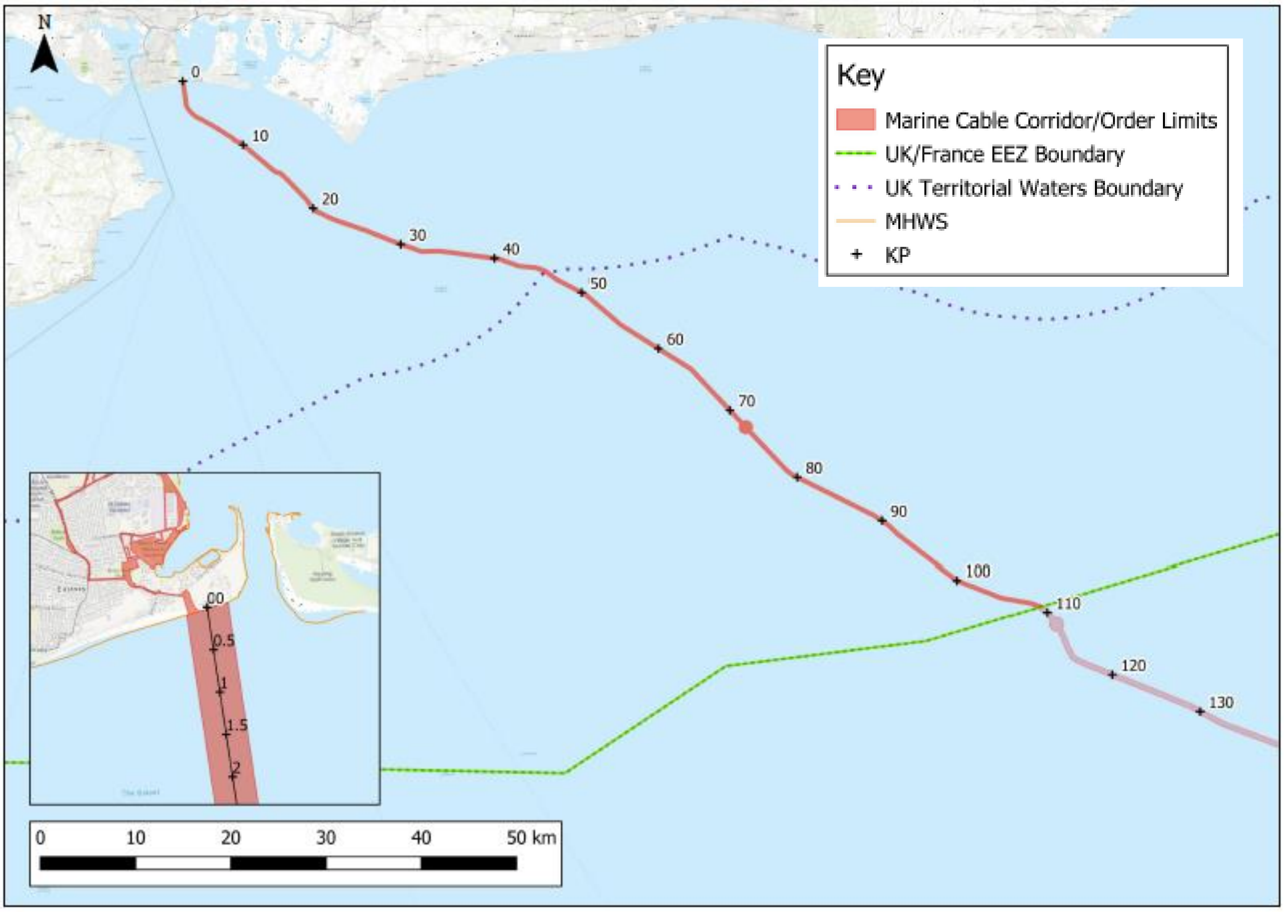

Plate 3.2 - UK Marine Cable Corridor (Mean High Water Springs = MHWS; Mean Low Water Springs = MLWS; KP = Kilometre Point)

3.3.2. ROUTE PREPARATION FOR MARINE CABLES

3.3.2.1. Marine geophysical, geotechnical and benthic surveys have been undertaken specifically for the Proposed Development. Analysis of the survey data has identified that different types of preparation will be required prior to the installation of the marine cable:

- Seabed debris (Out of Service ('OOS') cables, wires, abandoned fishing gear) clearance using a pre-lay grapnel run ('PLGR') will be undertaken to clear seabed debris in advance of the cable lay and burial.
- Boulders - Surface boulders will be removed by ploughing and/or grabs.

- Sandwaves and large ripples - where possible, the marine cables will be routed within the Marine Cable Corridor to avoid mobile bedforms and therefore minimise the requirement for clearance. In areas where sandwaves and ripples are present, and where re-routing of the Marine Cables to avoid such features is not possible, two clearance options are being considered to enable the cables to be buried to the required depth; Mass Flow Excavation ('MFE') and dredging (and disposal of material) using a trailing suction hopper dredger ('TSHD') vessel.
- Uneven seabed due to the presence of gulleys, slopes and pits along the Marine Cable Corridor may require the placement of rock and/or the installation of mattresses, prior to cable installation, to create stable seabed surface to enable the safe installation of the Marine Cables.
- Construction of crossing structures over in-service cables that are crossed by the Marine Cables.

3.3.3. MARINE CABLE INSTALLATION

3.3.3.1. It is anticipated that the Marine Cables will be installed as two bundled pairs. Options for cable installation are dependent upon the characteristics of the seabed and the presence of seabed features and will be further informed through pre-construction surveys.

3.3.3.2. The Marine Cables will be carried on a cable lay vessel ('CLV') either on carousels or in cable tanks. The cables will be pulled via tensioners, overboard the vessel and on to the seabed. Depending on the burial technique adopted, trenching/burial can be simultaneous to cable lay, before cable lay (pre-lay or pre-cut trenching) or after cable lay (free-lay or post-lay burial).

Cable Burial

3.3.3.3. Cable burial can be achieved using ploughs, jet trenchers or mechanical trenchers. It is likely that a combination will be used for the Proposed Development to take into account different water depths and seabed conditions.

Cable Burial Depth

3.3.3.4. The Proposed Development requires installation of the four HVDC cables as two cable circuits, likely as bundled pairs. The spacing between two bundled pairs is driven by the operational spacing requirements of the installation equipment and will typically be approximately 50 m between each bundled pair.

3.3.3.5. Preliminary estimates suggest that the target depth to achieve burial protection against external hazards in UK waters generally varies from 1.0 m to 3.0 m. These target depths are from a stable seabed level, i.e. after clearance of significant sandwaves and large ripples and they have been informed through the results of the marine surveys and a Cable Burial Risk Assessment ('CBRA') carried out to date.

Non-Burial Protection Measures

3.3.3.6. Where it is not possible to bury the cable under the seabed to the target depth, non-burial protection such as tubular protection, mattressing, rock placement and/or rock/grout bags will be required to protect the cables from anthropogenic (i.e. fishing and vessel anchoring) and natural hazards (i.e. currents and mobile sediments).

Cable Crossings

3.3.3.7. The Marine Cable Corridor crosses one in-service cable; the Atlantic Crossing at KP 72.5 (red circle within the Marine Cable Corridor shown in Plate 3.2) a subsea telecommunications cable which links the USA with three European countries. A cable crossing agreement will be put in place with the relevant parties, in line with the relevant guidance. This agreement will detail the design and methodology for the cable crossing. It is anticipated that non-burial protection methods will be employed at the cable crossing.

Non-Burial Protection for Repair and Maintenance

3.3.3.8. The requirement for additional non-burial protection (currently proposed to be an additional 10% or 11 km of the cable route required) which may be needed during the first 15 years of the operational phase of the Proposed Development has been considered within the assessments undertaken.

3.3.4. MAINTENANCE AND REPAIR

3.3.4.1. The Proposed Development has been designed so that routine maintenance to the Marine Cables is not required during their operational lifetime. However, there may be the requirement to undertake unplanned repair works, due to the following events:

- Mechanical/electrical failure of components within the cables;
- Exposure of, or damage to, the cables as a result of fishing activities and/or vessel anchoring; and

- Exposure of cables due to changes in seabed morphology (e.g. areas of free spanning) or changes in hydrodynamics (e.g. increase in bed erosion due to dredging works in the vicinity of the Marine Cables).

3.3.5. DECOMMISSIONING OF MARINE CABLES

3.3.5.1. The Marine Cables will be designed, manufactured and installed for a minimum service life of 40 years.

3.3.5.2. Decommissioning activities would be determined by the relevant legislation and guidance available at the time of decommissioning. In addition, a decommissioning plan will be developed and agreed with The Crown Estate. It is anticipated that a separate Marine Licence application for decommissioning works may be required closer to the time of decommissioning. A decommissioning plan would support the Marine Licence application and provide the level of detail that cannot be provided years in advance.

3.4. ONSHORE INFRASTRUCTURE

3.4.1.1. The Onshore Components of the Proposed Development are all elements of the Proposed Development above the Mean Low Water Spring ('MLWS') level (Figure 3-2).

3.4.1.2.

HVAC Cables

3.4.1.3. To facilitate the connection to the National Grid Lovedean Substation it will be necessary to provide additional electrical infrastructure. The electrical connection equipment at Lovedean Substation is expected to be a combination of Air Insulated Switchgear ('AIS') and Gas Insulated Switchgear ('GIS').

3.4.1.4. There will be two 400 kV HVAC cable circuits that will connect the proposed Converter Station to the Lovedean Substation (each comprising three cables). Each HVAC Cable Circuit will sit in a single trench. One connection point is proposed to be located on the western side of the Lovedean substation and the other on the eastern side of the substation for each HVAC cable circuit.

3.4.1.5. The HVAC Cable Corridor through which the HVAC onshore cables will be installed is proposed within the area of land between Lovedean Substation and the proposed Converter Station.

3.4.1.6. The HVAC Cable Route, providing the link between the Converter Station and the National Electricity Transmission System ('NETS') via Lovedean Substation, will be located within the HVAC Cable Corridor and will be up to 1 km in length. The AC Cables are proposed to exit the Converter Station on its eastern side.

3.4.1.7. Installed alongside the AC Cables may be an earth continuity conductor, which is an insulated metallic conductor to provide a path to earth for any fault currents.

3.4.1.8. There is also a requirement for a Fibre Optic Cable ('FOC') to be installed alongside each HVAC Cable Circuit in the same trench for control and protection and cable monitoring purposes.

3.4.1.9. Electric fields from the AC Cables will be contained by the cable's protective metal sheath.

Converter Station Area

3.4.1.10. A Converter Station is required to convert electricity from HVDC, used to transmit electricity between the UK and France, and HVAC, used to transmit electricity within the National Electricity Transmission System in both countries.

3.4.1.11. The proposed Converter Station footprint of 200 m x 200 m (4 ha) will be within a securely fenced compound. The finished ground floor slab level would be 300 mm above the Converter Station finished site level (i.e. top of gravel chipping).

3.4.1.12. The Converter Station consists of a number of interconnected components which need to be connected sequentially, with the built form for each dictated to a high degree by their function.

3.4.1.13. The components are arranged whilst considering the most efficient connection method between them and the minimum spacing of the equipment to ensure safe operation and maintenance.

3.4.1.14. The outdoor equipment which forms part of the proposed Converter Station will be similar to the equipment that is found within typical electrical substations, such as the adjacent Lovedean Substation. The 400 kV switchyard (transformers and AC filters will be located outdoors.

3.4.1.15. The Converter Station will be lit when necessary using energy efficient luminaries mounted atop mid-hinged columns to provide ease of maintenance. Lighting columns, up to 15 m high (see items 15 and 16 in Plate 3.9) are proposed to illuminate the outdoor areas of the Converter Station during emergency situations, such as an intruder or unplanned maintenance work. The lights are not intended to be used during normal operation.

3.4.1.16. Given the topography of the Converter Station Area, bulk earthworks would be required to create a level platform to accommodate the Converter Station.

3.4.1.17. Preliminary foundation assessment has concluded that the foundations are likely to be a combination of conventional ground bearing and piles dependent on the location, loading and acceptable settlement and differential settlement.

3.4.1.18. The construction of the platform for the main Converter Station site will be one of the initial activities undertaken. It is usual/standard practice for the site establishment, fencing/hoarding, bulk earthworks (and related drainage works) and site access road works to be undertaken as an initial enabling works preparation contract. This allows construction works to concentrate on the activities which construct the site working platform and access, the completion of which allows the rest of the main site works to commence.

3.4.1.19. Landscaping (including reprofiling if/where appropriate and associated planting) is proposed around the perimeter of the Converter Station compound and at other necessary/appropriate locations.

3.4.1.20. The FOC Infrastructure will be used for communications between the French and UK Converter Stations in connection with the control and protection systems, and hence is required to be installed with both HVAC and HVDC Cables. Additionally, the FOC will continue to monitor the condition of both the Onshore and Marine Cables.

3.4.1.21. To withstand the various physical impacts which the FOC are likely to be subject to associated with transportation, installation and operation in the marine and underground environment and protect the glass fibres located within it, the FOC are required to be of an adequate outer diameter. Within the required outer diameter for the FOC, 192 glass fibres may be installed. Each FOC is required to include a sufficient amount of glass fibres for its use in connection with the primary use of the interconnector and as redundancy for this purpose in the event of individual glass fibre failures. The number of glass fibres required in connection with the primary use of the interconnector and as redundancy for this purpose is less than 192, though this is a multiple of fibres that is commonly produced by manufacturers of such cables.Two Telecommunications Buildings (one for each HVDC Circuit) are proposed to be located in close proximity to the Converter Station to house required telecommunications equipment. The Telecommunications Buildings associated with the FOC are anticipated to be located outside the main Converter Station security fence. This is to enable the equipment to be more easily accessible in connection with the proposed use of fibres for commercial telecommunications purposes.

3.4.1.22. Each Telecommunications Building will have a maximum footprint of 8 m long x 4 m wide x 3m high and will also have secure fencing, access and parking for up to two vehicles for maintenance purposes. It is currently anticipated that the compound for the Telecommunications Buildings would have a maximum size of 10 m x 30 m.

3.4.1.23. The proposed access to the Converter Station for construction and operation will be taken from Broadway Lane and Day Lane, in the vicinity of the junction of these two highways.

3.4.1.24. The Access Road to the Converter Station will be approximately 1.2 km in length, and is expected to be a standard width (no wider than 7.3 m) suitable for transportation of Heavy Goods Vehicles ('HGVs') and Abnormal Indivisible Loads ('AIL').

Onshore Cable Corridor

3.4.1.25. The Onshore Cable Corridor represents the maximum extent of the area within which the Onshore HVDC Cables may be located, otherwise described as the limits of deviation. It is necessary to ensure flexibility for the siting of the Onshore HVDC Cables within the limits of deviation so as to ensure statutory undertaker apparatus can be effectively navigated and the installation of the Onshore HVDC Cables can be optimised by the chosen contractor following the making of the Order.

3.4.1.26. Two Onshore HVDC Cable Circuits are proposed to be installed in the Onshore Cable Corridor between Converter Station and the Landfall.

3.4.1.27. Each Onshore HVDC Cable Circuit will contain two HVDC Cables and one FOC and will be installed independently from one another. Each circuit could be installed at different times by different contractors.

3.4.1.28. Where necessary, a spacing of approximately 5 m is maintained between the trenches, to ensure the thermal independence of each circuit. Each excavated trench would be approximately 0.7 m in width but could increase to 1 m in order to facilitate the cables being installed deeper, when navigating existing utility services.

3.4.1.29. For the majority of the Onshore Cable Route the Onshore HVDC Cables will be installed in excavated trenches. Rather than being laid in the trench, a form of housing (known as cable ducts) will be installed in the trenches. At a later date after sections of ducts have been installed, lengths of cables will be pulled through the ducts.

Due to the significant number of existing utility services within the Onshore Cable Corridor, it is expected that the installation rate for cable ducts for one circuit will be approximately 18 m – 30 m per day on average and typically in 100 m sections, and at approximately 50 m per day in open countryside. These typical installation rates are per gang per shift and are dependent upon the level of obstacles and utility services encountered within the road or constraints that need to be observed to minimise the impacts during construction.

3.4.1.30. Joint Bays will be required at points along the route, and these will be used for pulling the cable through the cable ducts before joining one section of cable to another. The number of joint bays along the length of the cable route is dictated by the length of cable that can fit on a cable drum (the drum-shape reel on which the cable is stored prior to installation) and limits to the pulling tension required to pull the cable through the ducts. Joint Bays are likely to be required every 600m to 2000m along the Onshore HVDC Cable Circuits and will be positioned in highway verges, fields or car parks, where possible, to limit the need for road closures.

3.4.1.31. Link Boxes are typically located alongside a Joint Bay and are accessed via a man-hole cover, installed at the same level of the surrounding ground. The dimensions of a Link Box are approximately 0.8 m x 0.8 m x 0.6 m. Link Pillars are frequently used on arable land (instead of Link Boxes) and they are normally located adjacent to hedgerows. They are accessed via doors at the front of the Link Pillar and the dimensions are approximately 1.0 m x 1.0 m x 0.6 m. The Link Boxes (or Pillars) are connected to the metal casing of the joint via underground bonding leads.

3.4.1.32. In certain areas the Onshore HVDC Cables will be installed in ducts using HDD or trenchless installation methods.

3.4.1.33. A trenchless technique is common for crossing of Network Rail assets in preference to HDD, and for this reason, micro-tunnelling is proposed to cross the railway north of Farlington Playing Fields. This alternative method of trenchless installation enables cables to be installed within ducts or pipes under a feature with minimal impact on that feature.

3.4.1.34. HDD is to be used to allow cables to cross under certain constraints along the route, namely waterways and environmentally sensitive areas. The HDD operation drill bores through the ground into which the cable ducts are pulled, through which the HVDC cable circuits will be pulled at a later date. The maximum depth will typically be between 5 m and 20 m, depending upon the length of the crossing and the local ground conditions.

3.4.1.35. The HDD operations require a suitable space for the temporary construction area, which can typically be up to approximately 50 m x 50 m depending on the length and size of the HDD works. The HDD operations require a working area to locate the drilling rig, water bowser/pump, generator, layout of ducts/pipes and other construction equipment.

3.4.1.36. The HDD bores that are required for each of the four HVDC Cables would have to be suitably spaced to achieve the required cable rating. Typically, this spacing is approximately 5 m between adjacent ducts at the entrance and exit of the HDD and may increase to approximately 15 m depending on burial depth. The maximum width of cable reserve (area required for installing the four individual HVDC Cables with suitable spacing between taking in to account the maximum burial depth) has therefore been assumed to be approximately 60 m.

Landfall

3.4.1.37. The Landfall, located at Fort Cumberland car park south of Fort Cumberland Road in Eastney, was chosen following a detailed site selection process, as described in Chapter 2 of the ES (Consideration of Alternatives). The Landfall forms the transitional area between onshore HVDC cable circuits and the marine HVDC cable circuits. The marine HVDC cable circuits will be pulled ashore and jointed to the onshore HVDC cable circuits at the Transition Joint Bays ('TJBs').

3.4.1.38. HDD has been identified as the most suitable cable installation method at the Landfall, as opposed to open trenching methods. The use of HDD ducts avoids trenching through the beach and ensures that the cables are well protected in the shallow water immediately offshore. Cables installed by trenching could be vulnerable to damage, without the provision of additional protection.

3.4.1.39. The landward ends of the ducts will be approximately 200m inland of, and at a higher elevation than, the MHWS mark.

3.4.1.40. There will be two TJBs, one per HVDC Circuit. Each TJB will require an excavation of approximately 15 m x 5 m, to a depth of up to 1.75 m. Once the joint is complete, these excavations are backfilled and the land reinstated.

3.4.1.41. During the construction works, an area of approximately 15 m x 5 m adjacent to the TJBs is required for the jointing workshop, storage, parking, generator, welfare and security.

3.4.1.42. The cables will be pulled into the TJB, ready for jointing. During the cable pulling operation, an area of approximately 15 m x 12 m at either end of the TJBs are required for the cable drum and stand, plus space for delivery and offloading of cable drums (at one end) and the winch and anchor (at the other end).

3.4.1.43. The TJB installation works will take approximately 16 weeks (total for both circuits).

3.4.1.44. To amplify the signal of the FOC across the full distance of the Cable between the French and UK converter stations, up to two Optical Regeneration Stations ('ORS') (one for each circuit) are to be located within Fort Cumberland car park at Eastney.

3.4.1.45. Each ORS building will have dimensions of up to 10 m long x 4 m wide x 4 m high, which would house signal amplification and control equipment associated with the FOC, required to ensure the signal strength is adequate between the UK and French Converter Stations. For safety purposes is necessary for them to be located 10 m apart.

3.4.1.46. The ORS compound construction is expected to take 12 weeks.

Decommissioning

3.4.1.47. The Applicant is seeking consent for installation and operation of the Proposed Development for an indefinite period. The Converter Station will be designed, manufactured and installed for a minimum service life of 40 years. Major items of equipment (e.g. transformers, circuit breakers, reactors) are designed to meet the lifetime of the Proposed Development and should remain operational for their design life subject to regular maintenance, inspection and availability of spare parts. If the Proposed Development and associated equipment is deemed to have reached the end of its design life, then the equipment may be decommissioned in an appropriate manner, and all materials reused and recycled where possible.

3.4.1.48. It is anticipated that the HVDC Cable's operational lifetime will exceed that of the Converter Station equipment, however at the end of the HVDC Cable's asset life, the options for decommissioning will be evaluated. The preferred option with the least environmental impact is to leave the cable in-situ within the buried ducts.

3.5. CONSTRUCTION PROGRAMME

3.5.1.1. The indicative worst-case programme, outlined in Table 3.1, has formed the basis of the HRA and allows for a more flexible approach to cable installation to accommodate disruptions and weather down time. In addition, some seabed preparation and marine installation activities may occur in the winter. Seabed preparation may also be phased more closely to cable lay and burial.

3.5.1.2. In Table 3.1, the orange bars represent tasks, whilst the green bars represent the individual activities within those tasks. These are current estimates for sequencing of activities, however, in order to maintain flexibility in the construction programme, these individual activities may occur at other times during the period allocated to the overall summary task, although sequencing is likely to remain similar.

3.5.1.3. Illustrative durations for activities are also provided, where work relating to the two cable pairs are undertaken separately, this is identified (e.g. pair 1 + pair 2, but they might still be undertaken 'in parallel' in terms of timing). Where they are anticipated to be undertaken at the same time i.e. jointly (e.g. pair 1 and pair 2 in the same operation, which is more likely for sandwave clearance, boulders or cable crossing), they are shown cumulatively.

Table 3.1- Indicative construction programme

			2021		2022				2023				2024			
Key Task	Related Activities	Indicative Duration (Weeks)	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Seabed Clearance /Preparation	**All activities**															
	Pre-lay grapnel run ('PLGR') and OOS cable recovery	4 (in parallel) 8 (separately)														
	Boulder clearance	15 (jointly)														
	Sandwave clearance	17 (jointly)														
	Cable crossing preparation	1 (jointly)														
Landfall Installation	**All activities**															
	Preparation, drilling and duct installation	44														
	Transition Joint Bay															
	ORS															
Marine Cable Installation (UK)	**All activities**															
	Nearshore cable lay and burial	14 (in parallel) 25 (separately)														
	Offshore cable lay	16 (in parallel) 30 (separately)														
	Offshore cable burial	4 (in parallel) 8 (separately)														
	Remedial protection*	21 (in parallel) 42 (separately)														

			2021		2022				2023				2024			
Key Task	Related Activities	Indicative Duration (Weeks)	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Cable Crossing	All activities															
	Construction of crossing	2 (jointly)														
Onshore Cable Installation (UK)	All activities															
	Route construction															
	Cable pulling															
	Jointing and terminating															
Converter Station Construction	All activities, including reinstatement															
	Enabling /Diversion Works															
	Main Civils Construction works															
	Mechanical and Electrical Work															
Converter Station Commissioning	All activities															

* This includes transit to and from the quarry, and loadout, and therefore, depending on the actual requirements for remedial works, the total time in the corridor within this window is likely to be 6-10 weeks, and only for a few days on each occasion. If a larger vessel was used, the volumes would be the same, but fewer loads needed, possibly a small overall window and fewer visits to the Marine Cable Corridor, but the visit might be a few days longer.

3.6. CONSTRUCTION PROGRAMME ONSHORE

3.6.1.1. The indicative programme associated with the UK onshore elements of the Proposed Development, outlined in Table 3.2, has informed the HRA and allows for a more flexible approach to cable installation.

3.6.1.2. The indicative construction programmes take account of a number of constraints. These include constraints and assumptions associated with traffic management (further detail is contained within the Traffic Management Strategy, within the Transport Assessment APP-449), environmental considerations and public activities and events.

3.6.1.3. Environmental constraints have also been taken into consideration and will be built into the phasing of enabling and construction works for the Converter Station site and Onshore Cable Route, notably;

- Badger breeding season from June-November, refer to Chapter 16 (Onshore Ecology) for further information and the conditions which will be observed.
- Plant growing season and winter wet season from August to November, at Kings Pond Meadow SINC and Denmead in Section 3, refer to Chapter 16 (Onshore Ecology) for further information,
- Wintering bird season, from October and March. Refer to Chapter 16 (Onshore Ecology) for further information on wintering birds and the conditions which will be observed.

Table 3.2 - Indicative onshore cable installation programme

Indicative Activity	Indicative Programme
Converter Station Construction	Q3 2021 – Q1 2024
Onshore HVDC Route Construction	Q3 2021 – Q4 2023
Landfall Construction	Q3 2021 – Q4 2023
Onshore HVDC Cable Installation	Q4 2022 – Q4 2023
Converter Station Commissioning	Q4 2023 – Q2 2024

4. ENVIRONMENTAL BASELINE (MARINE)

4.1. INTRODUCTION

4.1.1.1. The following sections provide an overview of the baseline environment relevant to the assessment of the effects of the Proposed Development on European sites and European offshore marine sites. This information is provided here in order to provide a basis for the assessment presented in Sections 5 and 6.

4.2. MARINE ENVIRONMENT

4.2.1. STUDY AREAS

4.2.1.1. The Proposed Development includes both the cable Landfall and the Marine Cable Corridor.

4.2.1.2. The 'Landfall' is defined as the HDD entry/exit location off the coast of Eastney, where cables will travel under the intertidal area (inshore from the HDD marine entry/exit point), and the Marine Cables come ashore above MHWS. The Landfall also includes the section of HDD works that crosses underneath the north-west corner of Langstone Harbour (although this section is exempt from requiring a marine licence).

4.2.1.3. The Marine Cable Corridor extends from MHWS at Eastney, out to the UK/France EEZ Boundary Line.

4.2.1.4. The study area includes the marine area around the Marine Cable Corridor, encompassing the Solent, the sea area around the Isle of Wight and the Southampton coastline as far as the Selsey Bill, with the greatest detail provided within the Marine Cable Corridor and immediate vicinity. Focus is given to SACs located within 10 km of proposed activities, however consideration is also given to SACs designated for benthic habitats within 50 km of activities to establish potential connectivity which also includes sites within French waters. This study area is considered sufficient to encompass the area for potential connectivity with the Proposed Development. The Zone of Influence ('ZOI') has been determined based on the outputs of sediment plume dispersion modelling undertaken to assess the plumes of suspended sediment created during sediment disposal operations resulting from sandwave clearance. The maximum extent of the plume is predicted to extend up to 25 km from the Marine Cable Corridor during dredge disposal activities along an east-west axis. Figures 4.1 and 4.2 (APP-492 and 493) illustrate the sites considered for Annex I habitats and Section 6 of this report provides further detail on how sites were identified for assessment in relation to the ZOI.

4.2.1.5. For mobile features such as fish, marine mammals and marine ornithology, the study areas as shown in Table 4.1. Similar to Annex I habitats, the worst case maximum ZOI of potential effects for mobile features will extend 25 km from the Proposed Development due to indirect effects from suspended sediments, however, it should be noted that not all effects assessed will have ZOIs that extend this far.

Table 4.1 - Study areas for mobile species

Feature Group	Study Area	Justification
Fish (see Figures 4.3 and 4.4)	The Channel including the UK and French marine areas and the rivers that flow into the Channel.	International Council for Exploration at Sea ('ICES') rectangles within the central to eastern channel. Relevant ICES rectangles are shown in Plate 4.1. It is considered that the Proposed Development has potential connectivity with a number of sites as it lies within the migratory range of fish features. Figures 4.3 and 4.4. (APP-494 and 495 illustrate the sites considered and Section 6 of this report provides further details on those sites and the potential effects to migratory fish features.
Marine mammals (see Figures 4.5 and 4.6)	The eastern Channel including the UK and French marine areas	As marine mammals range widely, animals using the UK's eastern Channel region are also likely to use French waters including those which are encompassed by French SACs. It is considered that the potential for connectivity of sites to the Proposed Development is based on the foraging range of seals or likely population range of cetaceans that are features of these sites. Figures 4.5 and 4.6. (APP-496 and 497) illustrate the sites considered and Section 6 of this report provides further details on connectivity.
Marine ornithology (see Figures 4.7 and 4.8)	Breeding colonies. The study area for breeding seabirds is defined by their mean-maximum foraging range (Thaxter *et al*., 2012; additional tracking data where this	It is considered that the potential for connectivity of sites to the Proposed Development is based on the mean-maximum foraging range of breeding seabirds that are features of these sites. Figures 4.7 and 4.8. (APP-498, Rev 02 and 499) illustrate the sites considered and Section 6 of this report provides further details on connectivity to those sites.

Feature Group	Study Area	Justification
	supersedes Thaxter *et al*., 2012).	
	Passage and wintering birds. The study area for passage and wintering species is defined by their wintering location and known migratory movements.	It is considered that the potential for connectivity to the Proposed Development is based on the wintering location and migratory movements of features of these sites. Figures 4.7 and 4.8. illustrate the sites considered and Section 6 of this report provides further details on connectivity to those sites.

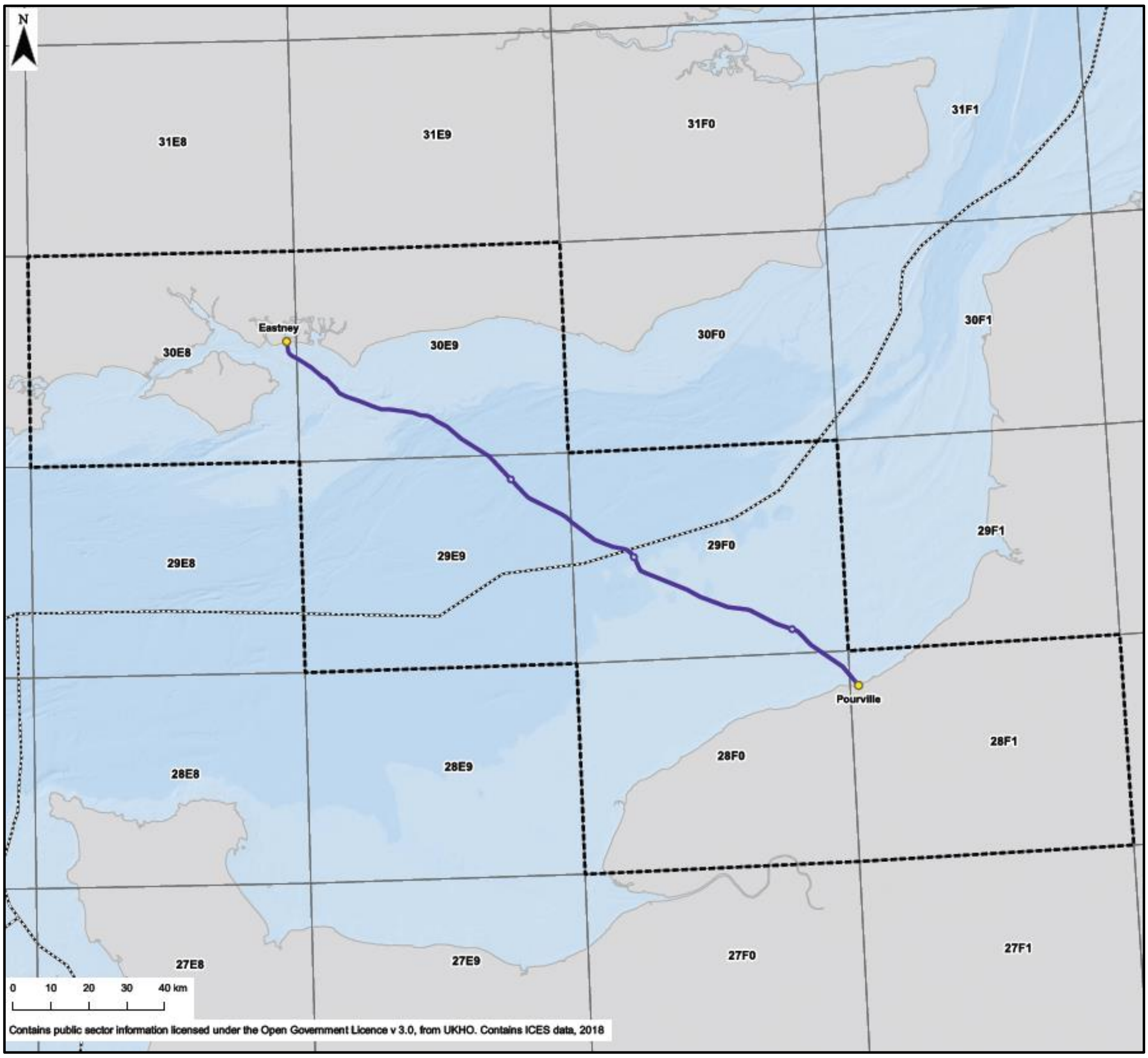

Plate 4.1 - ICES rectangles (bounded by black dotted line) identify the study area for Annex II diadromous migratory fish

4.2.2. ANNEX I HABITATS

Landfall and Intertidal Environment

4.2.2.1. The Landfall exhibits coastal vegetated shingle (Irving, 1996; James *et al*. 2010, EMU Ltd, 2012) which is listed as an Annex I habitat under the Habitats Directive (East Solent Coastal Partnership ('ESCP'), 2012) and this area is designated for its coastal vegetated shingle as part of the Eastney Beach Local Wildlife Site (LWS) (Portsmouth City Council ('PCC'), 2014). However, this habitat is located outside of a SAC.

4.2.2.2. The lower shore typically consists of ephemeral green and red seaweeds on variable salinity and/or disturbed eulittoral mixed substrata (LR.FLR.Eph.EphX, A2.821).

4.2.2.3. The site-specific survey found that the sediment at the Landfall most closely corresponded to barren or amphipod-dominated mobile sand shores (LS.LSa.MoSa; A2.22).

4.2.2.4. Seawalls most closely resembled *Porphyra purpurea* and *Enteromorpha spp*. on sand-scoured mid or lower eulittoral rock (A1.452; LR.FLR.Eph.EntPor), with boulder habitat further down the beach most closely resembled *Fucus spiralis* on sheltered variable salinity upper eulittoral rock (A1.322; LR.LLR.FVS.FspiVS).

4.2.2.5. The lower shore community most closely corresponded to the biotope *Laminaria saccharina* with foliose red seaweeds and ascidians on sheltered tide-swept infralittoral rock (A3.224; IR.MIR.KT.LsacT).

Marine Cable Corridor

4.2.2.6. A site-specific benthic survey (Appendix 8.1 of the ES in Volume 3, APP-377) identified predominantly sandy habitats in the nearshore (infralittoral fine sand; infralittoral mobile clean sand with sparse fauna; infralittoral mixed sediment) with a small patch of sand ripples in the Solent from 3 stations. The typical community structure is characterised by a range of species including polychaetes, amphipods, bivalves, tunicates, sea anemones and crabs.

4.2.2.7. The seabed habitat was ascribed to infralittoral fine sand (A5.23) where the Marine Cable Corridor overlaps with the Solent Maritime SAC. The nearest benthic grab sampling station (Station 1) located 0.3 km from the SAC boundary was identified as resembling infralittoral mixed sediments (A5.43). Station 2 (0.75 km from the SAC boundary, 1 km from the overlap area) was identified as resembling infralittoral mobile clean sand with sparse fauna (A5.231). Compared to published sources, EMODnet predictive habitat maps (EMODnet, 2016) show the sediment composition within the nearshore as predominantly high energy infralittoral sand (SS.SSa.IFiSa or SS.SSa.IMuSa; A5.23 or A5.24) and high energy infralittoral coarse sediment (LS.LCS; A5.13) with patches of high energy circalittoral coarse sediment (SS.SCS.CCS; A5.14), high energy circalittoral sand (SS.SSa.CFiSa or

SS.SSa.CMuSa; A5.25 or A5.26) and infralittoral/circalittoral sandy mud (SS.SMu.ISaMu, A5.33; SS.SMu.CSaMu, A5.35).

4.2.2.8. Outside of the nearshore area, the most widespread infaunal biotopes according to the benthic survey are offshore circalittoral coarse sediment (SS.SCS.OCS) and *Mediomastus fragilis*, *Lumbrineris spp*. and venerid bivalves in circalittoral coarse sand or gravel (SS.SCS.CCS.MedLumVen). The geophysical survey data for the area defined several outcrops of hardground intermittently covered by sediment of depths ranging from 5 m to 16 m. Boulder fields are common near to sampling station 21. Although epibenthic communities across the benthic survey area are generally sparse, elevated levels of silt at sampling station 22 have altered the habitat to a mixed substratum occupied by the brittlestars *Ophiothrix fragilis* and/or *Ophiocomina nigra*.

4.2.2.9. According to the literature, the UK South Coast region has been classified as large expanses of rock and thin sediment (EMU Ltd., 2012). Sediments within the deeper areas of the Marine Cable Corridor are predicted to be predominantly circalittoral coarse sediment (SS.SCS.CCS; A5.14) and offshore circalittoral coarse sediment (SS.SCS.OCS; A5.15), which is consistent with site specific survey data. Patches of circalittoral sand (SS.SSa.CFiSa or SS.SSa.CMuSa; A5.25 or A5.26), (offshore) circalittoral rock and other hard substrata (CR; A4), infralittoral coarse sediment (LS.LCS; A5.13) and infralittoral sand (SS.SSa.IFiSa or SS.SSa.IMuSa; A5.23 or A5.24) are also expected within the Marine Cable Corridor (EMODnet, 2016).

4.2.2.10. Additional habitats predicted within 20 km of the Marine Cable Corridor include infralittoral rock (IR; A3.1, A3.2, A3.3), deep circalittoral sand (SS.SSa.OSa; A5.27), sandy mud (SS.SMu.ISaMu, A5.33; SS.SMu.CSaMu, A5.35), fine mud (SS.SMu.IFiMu, A5.34; SS.SMu.CFiMu, A5.36) and mixed sediments (SS.SMx.IMx, A5.43; SS.SMx.CMx, A5.44; A5.45, SS.SMx.OMx) (EMODnet, 2016).

4.2.2.11. Patches of *Sabellaria spinulosa* was the most common species identified in grab samples at sampling stations 5 and 7, although it was not found in amounts required to correlate with any *Sabellaria* biotopes and no reef or encrusting formations were observed.

4.2.2.12. The biotope *Ophiothrix fragilis* and/or *Ophiocomina nigra* brittlestar beds on sublittoral mixed sediment (SS.SMx.CMx.OphMx) was attributed to Station 22 and considered to have the potential to be representative of Annex I reef with medium resemblance of stony reef, according to Irving (2009), although it is recognised that the area is not within any designated or proposed Marine Conservation Zones (‘MCZs’) or SAC.

4.2.2.13. Rocky outcrops observed in other areas of the Marine Cable Corridor (e.g. sampling stations 7 and 8) were not deemed to be potential Annex I reef as they are poorly colonised and heavily influenced by scour from adjacent coarse sediments.

4.2.2.14. Subtidal sands and gravels (a UK Biodiversity Action Plan ('BAP') priority habitat) were identified across the majority of the benthic survey area.

Special Areas of Conservation (SACs)

4.2.2.15. The following baseline sets out a summary of the protected sites, and their habitats and species found in the vicinity of the Marine Cable Corridor (see Figures 4-1 and 4-2, APP-492 and 493).

Solent Maritime SAC

4.2.2.16. The Solent Maritime SAC covers 113.25 km^2 throughout the Solent (including Langston Harbour and Chichester Harbour) and areas within Southampton Water. The closest section lies immediately east of the Proposed Development, overlapping the Marine Cable Corridor for approximately 163.4 m^2. However, the Marine Cable Route begins outside of the SAC due to the use of HDD at the Landfall out to between KP 1 and KP 1.6, which exits in the subtidal environment offshore from the SAC (see Section 3.2).

4.2.2.17. This Solent Maritime SAC is designated for the following primary features;

- Estuaries [1130];
- *Spartina* swards [1320]; and
- Atlantic Salt meadows [1330].

4.2.2.18. The following Annex I habitats are present as qualifying features but not as a primary reason for selection:

- Sandbanks which are slightly covered by sea water all the time [1110];
- Mudflats and sandflats not covered by seawater at low tide [1140];
- Coastal lagoons [1150] (as a priority feature);
- Annual vegetation of drift lines [1210]
- Perennial vegetation of stony banks [1220];
- *Salicornia* and other annuals colonising mud and sand [1310]; and
- Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes") [2120].

4.2.2.19. In addition, Desmoulin's whorl snail (*Vertigo moulinsiana*) [1016] is present as an Annex II qualifying feature but not a primary reason for site selection, while several intertidal and subtidal habitats are described as subfeatures of primary and qualifying features of the Solent Maritime SAC.

South Wight Maritime SAC

4.2.2.20. South Wight Maritime SAC lies 3.3 km west of the Marine Cable Corridor and covers 198.6 km^2. It is designated for Reefs [1170], Vegetated sea cliffs of the Atlantic and Baltic Coasts [1230] and Submerged or partially submerged sea caves [8330]. Subfeatures include circalittoral rock, infralittoral rock, intertidal rock and subtidal stony reef.

Solent and Isle of Wight Lagoons SAC

4.2.2.21. Located at a distance of 5 km from the Marine Cable Corridor, Solent and Isle of Wight Lagoons SAC is designated for Coastal Lagoons [1150] as an Annex I habitat as the primary reason.

4.2.2.22. The Solent and Isle of Wight Lagoons SAC includes fourteen coastal lagoons, eight in the marshes in the Keyhaven to Lymington area, one in Langstone Harbour and one at Gilkicker, and four at Bembridge on the Isle of Wight (English Nature, 2005; Bamber *et al*., 2014).

Wight-Barfleur Reef SAC

4.2.2.23. The Wight-Barfleur Reef SAC is located south of the Isle of Wight approximately 34 km from the Marine Cable Corridor and is designated for Reefs [1170] as the primary reason for site selection.

Studland to Portland SAC

4.2.2.24. The Studland to Portland SAC lies approximately 70 km to the west of the Marine Cable Corridor off the south coast of Dorset and is designated for Reefs [1170] as a primary reason for site selection (Natural England, 2018).

Bassurelle Sandbank SAC/ Ridens et dunes hydrauliques du détroit du Pas-de-Calais Zone Spéciale de Conservation

4.2.2.25. Bassurelle Sandbank SAC is designated for Sandbanks which are slightly covered by sea water all the time [1110]. The Bassurelle Sandbank is an open shelf ridge sandbank formed by tidal currents and is located in the Dover Straight on the boundary between UK and French waters, approximately 60 km east of the UK Marine Cable Corridor at its nearest point and covers 62 km^2 at a depth range from 8 m to 140 m (JNCC, 2018a; JNCC, 2017a). The French part of this SAC (known as 'ZSC' in French) is called Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC and covers 682.45 km^2.

Littoral Cauchois SAC

4.2.2.26. An additional SAC located in French waters with close proximity to the Proposed Development is Littoral Cauchois SAC, however this site is located 52.7 km from the UK Marine Cable Corridor at its nearest point (i.e. the EEZ). It is designated for several Annex I habitats marine and terrestrial features as a primary reason for site selection. The marine habitats include;

- Reefs (Récifs) [1170],
- Vegetated sea cliffs Vegetated sea cliffs of the Atlantic and Baltic coasts [1230].

4.2.2.27. The site also includes many terrestrial features including:

- Perennial vegetation of stony banks [1220]
- Nutrient-poor shallow waters with aquatic vegetation on sandy plains Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110]
- Calcium-rich nutrient-poor lakes, lochs and pools Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. [3140]
- Naturally nutrient-rich lakes or lochs which are often dominated by pondweed Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation [3150]
- Wet heathland with Dorset heath and cross-leaved heath Temperate Atlantic wet heaths with *Erica ciliaris* and *Erica tetralix* [4020]
- Dry heaths European dry heaths [4030]
- Purple moor-grass meadows Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410]
- Tall herb communities Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [6430]
- Lowland hay meadows Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) [6510]
- Hard-water springs depositing lime Petrifying springs with tufa formation (*Cratoneurion*) [7220]
- Alkaline fens [7230]
- Caves not open to the public [8310]
- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae) [91E0]
- Atlantic acidophilous beech forests with Ilex and sometimes also Taxus in the shrublayer (*Quercion robori-petraeae* or *Ilici-Fagenion*) [9120]
- Asperulo-Fagetum beech forests [9130]
- Tilio-Acerion forests of slopes, screes and ravines [9180]
- Old acidophilous oak woods with Quercus robur on sandy plains [9190]

4.2.2.28. The site is also designated for Annex II species:

- Great crested newt *Triturus cristatus* [1166].

4.2.3. ANNEX II DIADROMOUS MIGRATORY FISH

4.2.3.1. The following sets out the baseline for those fish species that are interest features of European designated sites (i.e. SACs).

4.2.3.2. Although a large diversity of fish occurs in the Channel only a small number are listed as features of SACs (Annex II species) which also have a marine stage in their lifecycle (see Figures 4-3 and 4-4, APP-494 and APP-495, Rev 03). These species are:

- Twaite shad (*Alosa fallax*);
- Allis shad (*Alosa alosa*);
- Atlantic salmon (*Salmo salar)*;
- Sea lamprey (*Petromyzon marinus*); and
- River lamprey (*Lampetra fluviatilis*).

4.2.3.3. Although no fish specific surveys were undertaken for the Proposed Development a thorough literature review of publicly available data such as commercial fisheries landings data (by ICES rectangle and ICES Division data) and surveys from other developments in the Channel has been used to inform this baseline.

Allis and Twaite Shad

4.2.3.4. Both twaite and allis shad are members of the herring family (*Clupeidae*) and are the only two members of that family that spawn in freshwater in the UK. Shad generally have a westerly distribution in Europe with major rivers flowing into the Atlantic having the largest populations (Maitland *et al*., 2003). In the UK spawning populations of twaite shad are known to be present in a small number of rivers in Wales and on the England/Wales border which flow into the Severn estuary these include the rivers Tywi, Usk and Wye (Carstairs, 2000). Although twaite shad are present in other rivers further north, no other spawning stocks are known to exist (Maitland & Lyle, 2001).

4.2.3.5. Mature allis shad migrate into freshwater during late spring (April to June) and twaite shad in April and May, and spawning takes place over clean gravel for both species. Most allis shad die after spawning although twaite shad may spawn several times in their lives. After one to two years in freshwater, young shad descend down river to the sea where they remain for between three and eight years before returning to freshwater to spawn (Maitland *et al*., 2003).

4.2.3.6. In the Channel commercial fisheries data (average tonnage 2011 – 2016) (Marine Management Organisation ('MMO'), 2017) shows that shad are caught in both the coastal and offshore ICES rectangles (30E9, 30E8, 29F0 and 29E9) and also in ICES Division VII.7.d confirming they are present in this area (see Plate 4.1). The highest landings by weight are from the inshore rectangles 30E9 and 30E8 (five-year average 0.21 and 0.13 tonnes respectively, (MMO, 2017). It should be noted however that as shad are protected under the Wildlife and Countryside Act, they are prohibited from being specifically targeted within the UK 12 nmi limit and commercial fisheries data may not be reflective of shad numbers.

4.2.3.7. Surveys to inform the Rampion Offshore Wind Farm ('OWF') DCO application, 12 km east of the Proposed Development, confirm the presence of both the allis shad and twaite shad, where one specimen of each species was captured (RSK, 2012).

Atlantic Salmon

4.2.3.8. The Atlantic salmon (from here on referred to as salmon) is widespread in many parts of the British Isles. This species spawns in freshwater in late autumn where the young salmon remain for 1-3 years before migrating to the marine environment as smolts to feed. After between 1-5 years at sea the mature salmon return to their natal river to spawn.

4.2.3.9. Rod catch data for several UK rivers (including the Itchen and Avon) flowing into the Channel show the highest catches to occur between May to September (Environment Agency, 2018). This indicates the period when salmon destined for these catchments are actively migrating into freshwater.

4.2.3.10. The downstream migration of smolts generally occurs in the UK during April and May however a specific study undertaken on the River Itchen revealed that some smolts also migrate during autumn (September – November inclusive) and as late as January (Ridley *et al*., 2002).

4.2.3.11. During their marine stage salmon migration routes in the Channel are not fully understood however studies in Scottish rivers have shown that salmon migrate to feeding grounds around Greenland and the Faroe Islands (Malcolm *et al*., 2010). This indicates a general northerly marine migration with some variation from river to river (Malcolm *et al*., 2010).

4.2.3.12. Commercial fisheries data shows that salmon were landed in ICES Division VII.7.d in very low weights (five-year average of 0.01 tonnes). However, given the proximity of a number of rivers on the south coast where salmon are known to be present, they are likely to be in the vicinity of the Proposed Development either as adults and/or smolts.

Sea lamprey

4.2.3.13. The sea lamprey is the largest lamprey species in the UK. They are anadromous so live and feed at sea before returning to spawn in the freshwater reaches of rivers. Juvenile lamprey (*ammocoetes*) live in riverine sediment for a number of years before migrating to sea as transformers. Sea lamprey do not have any site fidelity and will spawn in any suitable river.

4.2.3.14. The distribution of sea lamprey in the UK is well documented with spawning occurring in rivers on the south east and west coasts of the UK. They are present in much of the Atlantic coastal area of western and northern Europe (Maitland, 2003). Mature sea lamprey enter rivers in early spring and spawn in late May or June in British rivers, with adults dying after spawning. The downstream seaward migration of transformers occurs from late autumn onwards (Scottish Natural Heritage ('SNH'), 2019).

4.2.3.15. Sea lamprey have no commercial importance and are therefore not targeted by commercial fishing practices. As a result, this species is not recorded in any landings data by ICES rectangle or ICES Division. It is considered however that given the proximity of the River Avon, where sea lamprey are known to spawn, they are likely to be in proximity to the Proposed Development at certain times of year.

River lamprey

4.2.3.16. The river lamprey, although smaller in size, shares similar life cycle characteristics to the sea lamprey. It spawns in the freshwater reaches of rivers during March and April with the ammocoetes living in the sediment for a number of years before migrating back to sea. The young lamprey do not share the oceanic migrations of the sea lamprey but remain mostly in estuarine and coastal environments for several years before returning to freshwater to spawn.

4.2.3.17. The distribution of this species is widespread with river lamprey ammocoetes occurring in many rivers from the Great Glen in northern Scotland southwards (Maitland, 2003).

4.2.3.18. There is no landings data available for river lamprey as they are not targeted commercially at sea. However, due to their wide distribution around the UK and proximity of a number of rivers to the Proposed Development they are likely to be in the coastal regions of the Channel at certain times of the year.

4.2.4. MARINE MAMMALS

4.2.4.1. Due to the mobile nature of marine mammal species, the study area is considered to be the entire eastern Channel region from MHWS out to the UK/French EEZ Boundary Line. However, because marine mammals range widely, animals using the study area are also likely to use French waters including those which are encompassed by French SACs (known as ZSCs in France; see Figures 4-5 and 4-6, APP-496 and 497).

4.2.4.2. A variety of marine mammal work has been done in the Channel including line transect survey (cetaceans) and telemetry work (seals). These data sources were examined but no project-specific marine mammal surveys were conducted. The key references for the main data sources are shown in Table 4.2 below.

4.2.4.3. The marine mammal fauna of the eastern Channel is poor, both in diversity of species and numbers of animals, compared to other parts of the UK. Information on the main species which occur in the study area (harbour porpoise, bottlenose dolphin, grey seal and harbour seal) has been summarised in Table 4.2 and is considered to be sufficient to identify the species for which SACs need to be considered and conduct an assessment of LSE given the nature of the Proposed Development and the fact that species occurrence in the Channel is unlikely to change in the short to medium term.

4.2.4.4. A local estimate of species density is available for just one of the four main species which occur in the area – harbour porpoise (0.213 animals per km^2; Hammond *et al*., 2017). This estimate, for the Channel survey block, is low compared to those for neighbouring survey blocks in the southern North Sea where density estimates range from 0.607 to 0.888 animals per km^2 (Hammond *et al*., 2017).

Table 4.2 - Summary of information on the main marine mammal species which occur in the eastern Channel

Species	Occurrence	Distribution	Key references
Harbour porpoise (*Phocoena phocoena*)	Present year round	Widespread	Evans (2006) Hammond *et al*. (2017) Jones *et al*. (2004) McClellan *et al*. (2014) Pettex *et al*. (2014)
Bottlenose dolphin (*Tursiops truncatus*)	Observed most commonly during summer (July-September)	Primarily an inshore species with most sightings within 10 km of land but can also occur offshore	
Grey seal (*Halichoerus grypus*)	Present year round	Widespread	Chesworth *et al*. (2010) Russell *et al*. (2017) Vincent *et al*. (2017)
Harbour seal (*Phoca vitulina*)	Present year round	Mainly coastal	

4.2.5. MARINE ORNITHOLOGY

4.2.5.1. This section sets out the baseline for those designated marine ornithological features which are present seaward of MLWS. A description of the baseline for ornithological features present inland of MLWS (e.g. terrestrial and intertidal features) is presented in Section 5 of this report.

4.2.5.2. Given the nature and scale of the Proposed Development, site-specific surveys for marine ornithology were not undertaken following the proportionate approach advocated by Chartered Institute for Ecology and Environmental Management ('CIEEM') (2019). Instead, information on aspects of seabird and inshore waterbird presence and ecology was collated from the literature to inform the baseline environment.

4.2.5.3. The overall abundance of seabirds and inshore waterbirds in UK waters within the Channel is relatively low (Bradbury *et al*., 2014; Wakefield *et al*., 2017), with numbers not reaching the necessary thresholds to qualify for marine SPA designation under the Birds Directive (Kober *et al*., 2010, 2012) (also see Figures 4-7 and 4-8, APP-498, Rev 02 and 499).

4.2.5.4. However, species diversity is high, and the Channel is an important area during migration (Steinen *et al*., 2007). Furthermore, whilst there is little suitable habitat for cliff-nesting seabirds, there are a number of internationally important tern and gull colonies present on the sand and shingle beaches, saltmarshes and offshore islets of the southern English coastline.

4.2.5.5. Table 4.3 provides a summary of the marine ornithological baseline as detailed in Chapter 11 Marine Ornithology of the ES for the Proposed Development.

Table 4.3 - Summary of the marine ornithology baseline

Feature	Abundance and Distribution in the Study Area
Common scoter; and **Eider**	Barne *et al*., (1998) state that common scoters are most abundant off Rye Harbour during the winter, approximately 90 km east of the Proposed Development. James *et al*., (2010) state that only a small number of seaduck observations were recorded during aerial surveys undertaken in 2007 and 2008 which overlapped with the Proposed Development, although these species may have been underestimated during surveys. Surveys undertaken more recently for the Rampion OWF, to the east of the Proposed Development, recorded a peak of 73 common scoters during boat-based surveys, and 210 using aerial surveys (RSK, 2012). Navitus Bay Wind Park (which had its DCO application rejected in 2015), situated to the west of the Proposed Development, estimated that *c*.1,600 common scoters passed through the Channel during spring and autumn migration, with a significant easterly movement in April (Natural England, 2012a; Navitus Bay Wind Park, 2014). Common eiders are also present in low abundance all along the southern English coastline in winter, including in harbours and estuaries (Royal Society for the Protection of Birds ('RSPB'), 2009). Frost *et al*., (2018) report a five year mean peak of two individuals in Chichester Harbour in October (2012/13-2016/17).
Great northern diver; **Black-throated diver; and** **Red-throated diver**	Great northern diver, black-throated diver and red-throated diver all occur in inshore waters of the Channel during the winter, albeit in relatively low abundance (WWT, 2013). James *et al*., (2010) report that the majority of diver records recorded during aerial surveys across the south coast region were off Brighton, >50 km to the east of the Proposed Development. Relatively low numbers were recorded during these surveys, with 171 noted in winter and two birds recorded during summer 2008. Low numbers of diver species were also recorded during baseline surveys undertaken for proposed OWFs. A peak of 91 red-throated divers was recorded during boat-based surveys undertaken for the Rampion OWF in 2010-12, with seven recorded during aerial surveys (RSK, 2012). At Navitus Bay Wind Park, a single black-throated diver was recorded during a boat-based survey in December 2009 (Navitus Bay Wind Park, 2014).
Great crested grebe; **Black-necked grebe;** **Red-necked grebe; and** **Slavonian grebe**	Grebe species are also present in inshore waters of the Channel during the non-breeding season (Barne *et al*., 1996; 1998). In particular, there is an over-wintering population of Slavonian grebe which utilises the Sussex coast, with nationally important numbers wintering in Pagham Harbour, *c*.9.5 km from the Proposed Development (20-25 individuals; Barne *et al*., 1998). There are also known black-necked grebe wintering sites in Langstone Harbour and Poole Harbour (Barne *et al*., 1996; RSPB, 2009), in the vicinity of the Landfall. Neither RSK (2012) nor Navitus Bay Wind Park (2014) report grebe species as having been recorded during baseline surveys, reflecting the species' inshore distribution.
Red-breasted merganser	Important numbers of red-breasted merganser are known to winter at Chichester, Langstone and Portsmouth Harbours (Natural England, 2019). Frost *et al*., (2018) state that a five year mean peak of 87 red-breasted merganser (2012/13-2016/17) has been present at Portsmouth Harbour. In Chichester and Langstone Harbours, a five year mean peak of 163 and 228 birds were recorded, respectively (2012/13-2016/17). Two red-breasted mergansers were recorded during baseline surveys at Navitus Bay Wind Park; one in April 2011 and one in November 2011 (Navitus Bay Wind Park, 2014), with none reported at Rampion OWF (RSK, 2012), again reflecting the more inshore habitat preferences of this species.
Fulmar; **Manx shearwater;** **Balearic shearwater; and** **Storm petrel**	Three of these pelagic species were recorded during aerial surveys of the south coast region in 2007 and 2008 (James *et al*., 2010): fulmar, Manx shearwater and storm petrel. Baseline surveys undertaken for Navitus Bay Wind Park and Rampion OWF also reported low numbers of Balearic shearwater passing through the region during migration (e.g. a peak of four birds during autumn at Navitus Bay; Navitus Bay Wind Park, 2014). Fulmar have been observed off the southern English coastline year-round, with a high concentration observed to the east of Portsmouth and the Proposed Development (James *et al*., 2010). Numerous fulmar nesting sites are present along the coastline in the region, with important numbers breeding between Brighton and Beachy Head, >50 km from the Proposed Development (WWT, 2009). Breeding fulmar are also present along the French coastline with important numbers breeding in Normandy (Le Guillou & Debout, 2012), located *c*.54 km from the Proposed Development. Furthermore, there is also a breeding fulmar population on Alderney within foraging range of the Proposed Development (D. Clifford 2019, pers. comm.). Both Manx shearwater and storm petrel breed at colonies further north, passing through the Channel during migration. Storm petrel also breeding on Alderney, *c*.142 km from the Proposed Development and thus some birds are also present within the Channel during the breeding season.
Gannet	Gannet are present in the Channel year-round (WWT, 2013). Baseline surveys undertaken for Navitus Bay Wind Park found that gannet was one of those most frequently recorded species during baseline surveys, with the highest numbers recorded during the breeding season (Navitus Bay Wind Park, 2014), which is consistent with other surveys (e.g. James *et al*., 2010; RSK, 2012). Pettex *et al*., (2014, 2017) also identified large numbers of gannets in the eastern

Feature	Abundance and Distribution in the Study Area
	Channel during winter, particularly in the Strait of Dover to the east of the Proposed Development. Most gannets recorded during baseline surveys undertaken for OWFs in the region recorded gannets in flight (RSK, 2012; Navitus Bay Wind Park, 2014). This is to be expected as gannets are a wide-ranging aerial foraging species (Snow & Perrins, 1998). Multi-colony tracking data show that breeding adult gannets present in the vicinity of the Proposed Development are most likely to originate from the colony at Les Etacs and Ortac, Alderney, rather than the colony on île Rouzic off Brittany (Soanes *et al*., 2012; Wakefield *et al*., 2013; Warwick-Evans *et al*., 2016; D. Clifford 2019, pers. comm.).
Shag; and **Cormorant**	Cormorants are known to breed at two locations within along the southern English coast in proximity to the Proposed Development: at the Needles on the western tip of the Isle of Wight, and at Studland Cliffs along the Purbeck Coast, west of the Proposed Development (Barne *et al*., 1996; Lake *et al*., 2011). Small numbers of shag also breed along the Purbeck Coast (Lake *et al*., 2011) but are otherwise largely absent from the region. Langstone and Poole Harbours are both important wintering sites for cormorant (Barne *et al*., 1996) with Frost *et al*., (2018) reporting a five-year mean peak of 66 cormorants in Portsmouth Harbour, with the highest numbers recorded in October. Low densities of both cormorants (0.01-0.09 birds/km^2) and shags (0.01-0.49 birds/km^2) were recorded by Stone *et al*., (1995) in coastal areas to the west of the Isle of Wight around Poole Harbour and around the Solent throughout much of the year. Rampion OWF recorded a peak of seven cormorants across its baseline survey campaign (RSK, 2012), whilst Navitus Bay Wind Park recorded a single cormorant during a boat-based survey in November 2011, and no shags (Navitus Bay Wind Park, 2014).
Great skua; **Arctic skua; and** **Pomarine skua**	James *et al*., (2010) report that limited numbers of skuas were recorded during aerial survey campaigns in 2007-2008 across south coast region. Indeed, aerial surveys conducted across the Channel as part of the Suivi Aérien de la Mégafaune ('SAMM') campaigns showed that the encounter rate for great skua was highest closer to the French coastline as well the south-western tip of the UK off the Cornish coast (Pettex *et al*., 2014, 2017). Boat-based surveys undertaken for Rampion OWF in 2010-2012 recorded 148 great skuas, 53 pomarine skuas and 10 Arctic skuas passing through the survey area. An estimated 1,114 Arctic skuas and 713 great skuas were considered to pass through the Navitus Bay Wind Park during spring and autumn, based on the outputs of a migration modelling tool (Navitus Bay Wind Park, 2014).
Sandwich tern; **Arctic tern;** **Common tern;** **Roseate tern; and** **Little tern**	Sandwich terns, common terns, roseate terns and little terns are present on the southern coast of England from April to August, breeding on sand and shingle beaches, saltmarshes and offshore islets (James *et al*., 2010). Breeding colonies in the vicinity of the Proposed Development are present at Chichester, Langstone, Pagham and Newtown Harbours, and at North Solent, Hurst Point to Pitts Deep and Lymington to Pylewell (Mitchell *et al*., 2004; Natural England, 2019). Arctic terns breed at colonies further north but pass through the Channel during migration in the spring and autumn (Wernham *et al*., 2002). James *et al*., (2010) report a total of 358 tern observations from aerial surveys undertaken in summer 2008. Tern records peaked in May during baseline boat-based surveys undertaken for Rampion OWF (RSK, 2012), with Sandwich terns (n=40), Arctic terns (n=180) and common terns (n=172) all recorded to species level, and a further 2,287 terns recorded as 'Arctic/common'. No roseate terns were recorded which may reflect their relatively low breeding numbers in the region compared to other tern species. The lack of little tern records may reflect their inshore feeding distribution (with a mean-max foraging range of 6.3 km; Thaxter *et al*., 2012).
Herring gull; **Great black-backed gull;** **Lesser black-backed gull and** **Yellow-legged gull**	Gulls were the most abundant and widely distributed seabird group recorded across the south coast region during aerial surveys undertaken in 2007-2008, with 14,835 individuals recorded during winter and 6,294 recorded during the summer (James *et al*., 2010). More recent boat-based surveys undertaken for Rampion OWF recorded a total of 34,551 gulls across all surveys. Of those large gulls identified to species level, herring gull was the most abundant (RSK, 2012). There are no major cliff-based gull colonies in the vicinity of the Proposed Development (Stroud *et al*., 1990), with the nearest breeding colony located at the cliffs between Brighton and Newhaven (WWT, 2009). However, there are an increasing number of roof-nesting lesser-black-backed gulls and herring gulls in Dorset and Hampshire (Nager & O'Hanlon, 2016). Many large gull species are present year-round in the vicinity of the Proposed Development. Indeed, within Portsmouth Harbour, Frost *et al*., (2018) report five-year winter mean peaks for lesser-black-backed gull (five), herring gull (170) and great black-backed gull (30). Small numbers of yellow-legged gull have been recorded during baseline surveys for Rampion OWF and Navitus Bay Wind Park during the non-breeding season (RSK, 2012; Navitus Bay Wind Park, 2014), with a known breeding site located at Poole Harbour.
Kittiwake; **Mediterranean gull;**	As with the large gulls, many small gull species are present in the Channel year-round in the vicinity of the Proposed Development. However, for species such as little gull and kittiwake, numbers increase during the winter as birds breeding at more northerly colonies move southwards (Pettex *et al*., 2017). Frost *et al*., (2018) report five-year winter mean peaks for black-headed gull (2,431) and common gull (192) within Portsmouth Harbour. Mediterranean gulls breed

Feature	Abundance and Distribution in the Study Area
Common gull; **Black-headed gull; and** **Little gull**	in important numbers at Newtown Harbour, North Solent and between Hurst and Lymington, with breeding black-headed gulls also present at these colonies (Natural England, 2019).
Guillemot; **Razorbill; and** **Puffin**	The south coast of England has relatively few cliff-based colonies of auks due to a lack of suitable habitat. However, small numbers of guillemots, razorbills and puffins breed along the Purbeck Cliffs, *c*. 60 km west of the Proposed Development (Barne *et al*., 1996; Lake *et al*., 2011). James *et al*., (2010) notes that the south coast region represents a more significant resource for auks during the winter months, with relatively high number observed at this time of year (RSK, 2012; Navitus Bay Wind Park, 2014; Pettex *et al*., 2017). Of the three auk species present in the region, guillemot are most abundant. Numbers of guillemots peaked in late spring during baseline surveys for Navitus Bay Wind Park and Rampion OWF as birds moved through the area on passage to more northerly breeding colonies (Navitus Bay Wind Park, 2014).

5. ENVIRONMENTAL BASELINE (ONSHORE)

5.1. ONSHORE ENVIRONMENT

5.1.1. STUDY AREA

5.1.1.1. The study area for the Proposed Development onshore principally includes the Converter Station Area, the Onshore Cable Corridor and the Landfall. To aid design development and environmental assessment the Onshore Cable Corridor has been divided into ten sections. These can be summarised as follows:

- Section 1 - The Converter Station Area - The northern section of the Proposed Development comprising the Access Road, Telecommunications Buildings, security fencing, temporary construction compound, car park and laydown areas;
- Sections 2 – 9 - The Onshore Cable Corridor - The Onshore Cable Corridor from the Converter Station Area at Lovedean to the Landfall at Eastney (approximately 20 km); and
- Section 10 - Landfall - The Landfall area including the two Optical Regeneration Stations "ORS", construction of underground infrastructure, temporary vehicular routes for construction vehicles, temporary construction compound, car park and laydown areas and construction vehicle movements.

5.1.1.2. The Landfall is defined as the HDD entry/exit location off the coast of Eastney, where cables will travel under the intertidal area, and the marine cables come ashore above MHWS.

5.1.1.3. The study area includes the onshore and intertidal areas adjacent to the Order limits of the Proposed Development onshore inland of MLWS, with all European sites within 10 km considered (Plate 5.1 and 5.2).

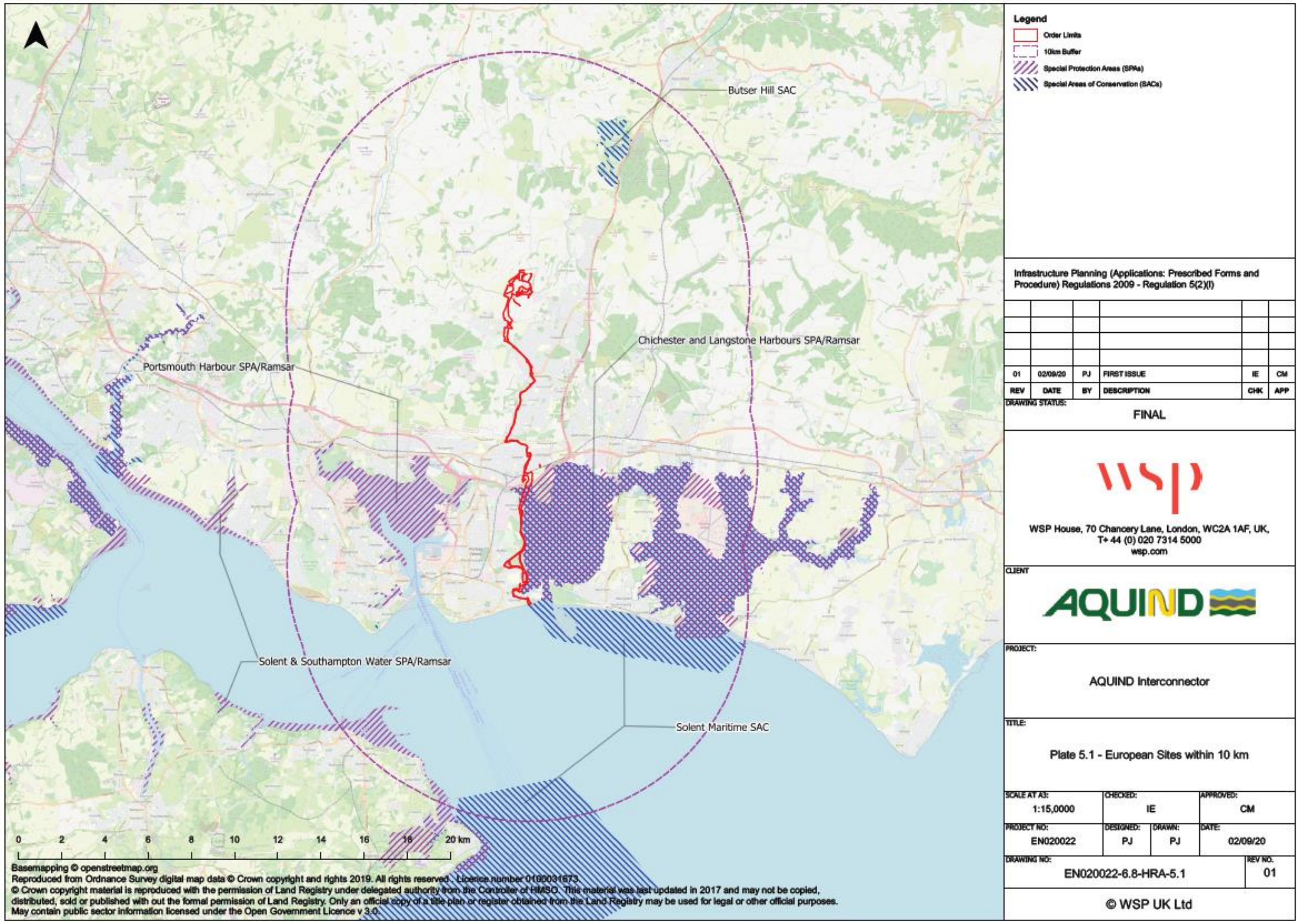

Plate 5.1 – European Sites within 10 km

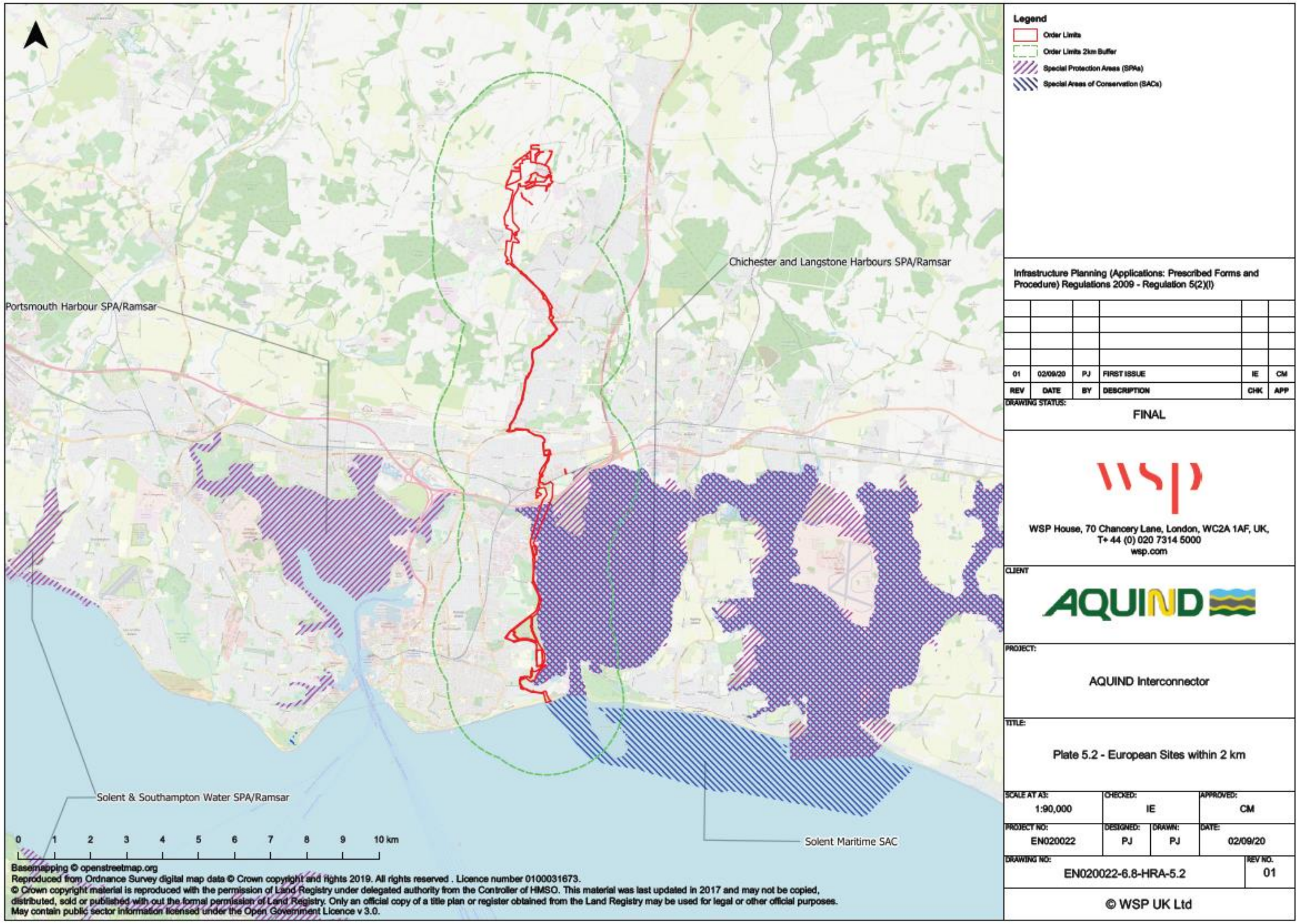

Plate 5.2 – European Sites within 2 km

5.1.2. HABITATS

Converter Station Area

5.1.2.1. The Converter Station Area is located within agricultural land on the edge of the village of Lovedean, Hampshire. The area is mainly composed of arable land (species poor semi-improved grassland) with hedgerows and small pockets of woodland, including ancient woodland, and residential development to the south-east. Habitats present in the Converter Station Area include Semi-natural broadleaved and plantation woodland, semi-improved improved grassland, arable and hedgerows. Full details of these habitats are described in the Preliminary Ecological Appraisal (APP-410) and updated within Chapter 10 of the ES Addendum.

Onshore Cable Corridor

5.1.2.2. The Onshore Cable Corridor largely passes urban areas of Portsmouth, Drayton, Purbrook and Waterlooville and is divided into eight sections (2-9). Scattered trees are present along the Onshore Cable Corridor, as are hedgerows. Habitats in the Onshore Cable Corridor include semi-natural broadleaved woodland, scattered scrub and trees, semi-improved grassland, arable and built-up areas. These habitats are fully described in the Preliminary Ecological Appraisal (APP-410).

Eastney Landfall

5.1.2.3. The Landfall is located in the car park south of Fort Cumberland Road, adjacent to the Land West of Fort Cumberland SINC. Fort Cumberland SINC and Scheduled Ancient Monument are located further east. The area also incorporates a section of Eastney Beach, a designated SINC. The Eastney Beach SINC exhibits coastal vegetated shingle which is listed as an Annex I habitat under the Habitats Directive and this area is designated for its coastal vegetated shingle as part of the Eastney Beach LWS (Portsmouth City Council, 2014). This is however located outside of a SAC. The baseline environment regarding habitats in the intertidal zone is fully explored under Marine Environment in Section 4.2.

5.1.2.4. Land West of Fort Cumberland SINC includes with habitats comprising semi-improved grassland, coastal heathland and scrub habitats. Eastney Beach SINC is situated to the south which comprises sand/shingle beach with concrete erosion protection and a mosaic of habitats resulting from derelict developments on the landward side; disused buildings, scrub, rough grassland and bare ground.

5.1.2.5. Onshore habitat present in the landfall consists of hardstanding with adjacent scrub, semi-improved and amenity grassland. These habitats are fully described in Preliminary Ecological Appraisal (APP-410).

5.1.3. SPECIES

5.1.3.1. A number of onshore Project-specific ecological surveys have been undertaken in order to inform the DCO Application. These include the following that had the potential to be relevant to HRA:

- Preliminary Ecological Appraisal (APP-410)– comprising a desk study of information obtained from key sources (including on European sites) and an Extended Phase 1 Habitat Survey (JNCC, 2010, CIEEM, 2016);

5.1.3.2. Surveys undertaken for both breeding and wintering birds are detailed separately below. Further surveys undertaken that are not considered to have any potential relevance to HRA include those for aquatic (freshwater) ecology, great crested newts, reptiles, badger and dormouse. These features while considered in Chapter 16: Onshore Ecology of the ES (APP-131) do not relate to features of any European Site within the vicinity of the Proposed Development and are therefore not considered in this HRA.

5.1.4. ORNITHOLOGY

5.1.4.1. This section sets out the baseline for those designated ornithological features which are present inland of MLWS. A description of the baseline for marine ornithological features seaward of MLWS is presented in Section 4.2.5.

Landfall and Intertidal Environment

5.1.4.2. Surveys during winter and breeding periods on the intertidal habitat adjacent to the Landfall and Onshore Cable Corridor (at Langstone Harbour) were undertaken as indicated in the Breeding Bird Survey Report (APP-420) and the Wintering Bird Survey Report (APP-421).

5.1.4.3. Breeding bird surveys were implemented through a vantage-point methodology to target any nesting or foraging locations for little tern, common tern and sandwich tern (qualifying features of Chichester and Langstone Harbours SPA/Ramsar site). The surveyors undertook surveys of 10 minutes in duration with the use of a telescope and binoculars. No tern species were found to be breeding within the Survey Area.

5.1.4.4. To determine the composition of the wintering bird community in and around Chichester and Langstone Harbour SPA/Ramsar site, six monthly survey visits were completed between October 2017 and March 2018 (Plate 5.3). These surveys followed prescribed methodology by the British Trust for Ornithology (2010) and Bibby et al., (2000).

5.1.4.5. Two different survey types at intertidal habitats were undertaken as described in Table 5.1.

Table 5.1 - Methods used during wintering bird surveys in intertidal habitat

Survey Type	Description
Intertidal survey	This survey methodology used was an adapted version of the standard BTO's Wetland Bird Survey (WeBS) (BTO, 2010), incorporating the direct counts methodology (Bibby et al., 2000). It involved two surveyors walking the western perimeter of the Chichester and Langstone Harbours SPA from Farlington Marshes to Fort Cumberland, the SPA's closest point to the cable route. Surveyors made frequent stops at suitable places to count birds seen and to record their location, taking notes of their behaviour (foraging, loafing, sleeping, preening etc). The survey area was defined applying a 500 m buffer from the Order Limits. The survey was undertaken twice per visit, once at low tide and once at high tide, in order to determine species usage depending on tidal cycle (i.e. foraging areas during low tide, roosts during high tide). The surveys were undertaken monthly between October 2017 and March 2018.
Vantage points at low and high tides	In addition to the above, surveyors spent one hour around high tide and low tide in two locations during the monthly visits, one in the north of the estuary at Farlington Marshes (467786, 104341) and another in the south at Eastney Beach (468108, 98993) counting birds flying over these sites. Surveyors recorded the species, flight direction and number of individuals that passed. The aim was describing the exchange of birds between the Site and the surrounding.

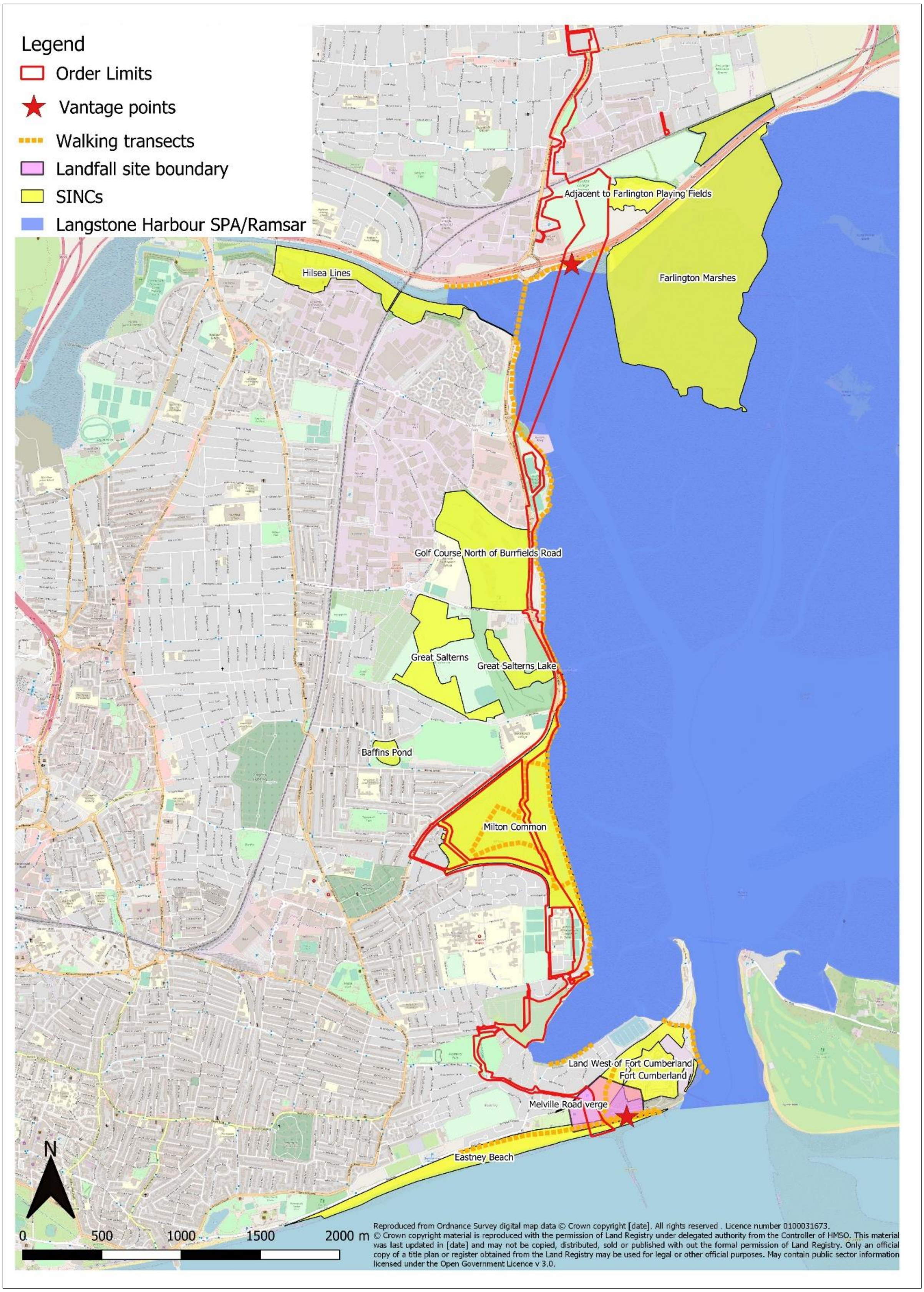

Plate 5.3 – Onshore wintering bird survey locations

5.1.4.6. Forty-five species of bird were identified during intertidal surveys. Peak counts (the highest number of observations of SPA (and/or Ramsar) qualifying species encountered on an individual survey visit) at low and high tide are shown in Table 5-2.

5.1.4.7. Peak counts highlight differences in the abundance of bird species across the whole survey area and identify those species which are dominant in the winter bird community, separating them from those which are represented only by small numbers or by single birds. The data show there are two highly abundant species that are features of the SPA (dark-bellied brent goose and dunlin), with numbers of observations significantly greater than the remaining species.

5.1.4.8. At low tide birds used the survey area to feed, foraging on the intertidal mudflats exposed by receding water for prey living in the mud and amongst small patches of rocky ground. As the tide came in, most species were observed leaving the survey area to find protection in high tide roosts elsewhere in the local area. Counts of birds were lower at high tide than at low tide for this reason (some species, e.g. dunlin and black-tailed godwit) were only observed at low tide and vacated the area completely during high tide), and few if any high tide roosts were observed. This is likely a function of the man-made seawalls that border Chichester and Langstone Harbour along its western side and the high levels of disturbance along the seawall, it having a popular pedestrian footpath used by the public for leisure, dog walking and running/fitness pursuits. However, some species more tolerant of disturbance and also that forage on more rocky substrates were more abundant at high tide. Sanderling, turnstone and redshank fell into this category, all being more abundant along the western side of the harbour during high tide.

5.1.4.9. Although low-tide is key for many species, both tide phases support foraging intertidal birds and there are few high tide roosting opportunities along the western side of the estuary. Results are discussed below on species that are qualifying features of Chichester and Langstone Harbours SPA/Ramsar site.

Dark-bellied Brent Goose

5.1.4.10. This was the most abundant species recorded during survey, and an important winter visitor as over 1% of the world population of the dark-bellied subspecies (*Branta bernicla bernicla*)[4]. This species overwinters in the Solent area with Chichester and Langstone Harbour being a favoured site. Brent geese were observed foraging on mudflats at low-tide, loafing in large groups on the water at high tide, and at both tides flying to/from and foraging terrestrial foraging sites. The number of observations of this species is inflated by its high mobility, with birds frequently flying to and from the harbour causing repeated counting of the same birds. However, using intertidal counts and counts from Solent Waders and Brent Goose Strategy Sites ('SWBGS')

[4] Carboneras, C., Christie, D.A. & Kirwan, G.M. (2018). Brent Goose (*Branta bernicla*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. & de Juana, E. (eds.). Handbook of the Birds of the World Alive. Lynx Edicions, Barcelona.

(see below) it is possible to conclude that several thousand individual brent geese use the intertidal survey area.

Shelduck

5.1.4.11. Shelduck was relatively abundant during the surveys with peak counts of 45 and 66 and 60 individuals at high and low tide respectively. Shelduck were distributed throughout the intertidal survey area.

Pintail

5.1.4.12. Pintail were also relatively abundant during the surveys although they were only present in smaller numbers until February 2018. Pintail were mostly observed at low tide and a peak count of 75 individuals occurred in February 2018. Pintail localised in their distribution to the area around the A2030 bridge and Farlington Marshes in the north of the survey area.

Shoveler

5.1.4.13. Shoveler were recorded on a single survey only, where two individuals occurred during low tide in December 2017.

Red-breasted Merganser

5.1.4.14. Red-breasted merganser were recorded sporadically during the surveys in low numbers. The peak count of 12 individuals occurred during high tide in November 2017. As this species is a diving duck few individuals were recorded at low tide when the survey area is dominated by intertidal mud.

Teal

5.1.4.15. Teal were consistently recorded during surveys at both high and low tide with peak counts of 33 (high tide December 2017) and 50 (low ide February 2018) respectively. Teal occurred in both intertidal areas in addition to waterbodies within Milton Common.

Grey Plover

5.1.4.16. Grey plover generally occurred only at low tide during the surveys (peak count of 19 in January 2018), with only one sighting at high tide. This species was restricted to intertidal mud habitat mainly in the south of the survey area.

Ringed Plover

5.1.4.17. Ringed plover was moderately common during the surveys (peak counts of 38 at low tide February 2018 and 58 at high tide October 2017), and was able to feed on open mudflats at low tide and close to the harbour wall amongst shingle at high tide.

Dunlin

5.1.4.18. A highly abundant small wader with peak counts of 2,000 birds within the intertidal survey area at low tide; however, this species almost completely vacates mudflats within the survey area at high tide to roost elsewhere. The intertidal survey area is clearly an important foraging area for this species in winter. Dunlin is BoCC Amber listed and one of the qualifying features of the Chichester and Langstone Harbours SPA.

Sanderling

5.1.4.19. Sanderling were found in small numbers during he surveys except March 2018 when 200 were recorded during high tide. All records were at Eastney Beach with no individuals recorded using the intertidal mud in Langstone Harbour.

Bar-tailed Godwit

5.1.4.20. Bar-tailed godwit records were restricted to a single individual during low tide in January 2018.

Black-tailed Godwit

5.1.4.21. Black-tailed godwit were recorded on four low tide surveys with a peak count of 75 birds in October 2017. No individuals of this species were recorded on high tide surveys, indicating that as the tide rises and obscures the mudflat, this species flies out of the survey area to find high tide roosts elsewhere.

Curlew

5.1.4.22. Curlew were common at low tide during the surveys (low tide peak count of 61 individuals in February 2018) with very few sightings at high tide (peak count of 2 individuals). This indicates that as the tide rises and obscures the mudflat, this species fly out of the survey area to find high tide roosts elsewhere.

Redshank

5.1.4.23. Redshank was more abundant at low tide (peak count of 103 in November 2017) than high tide (peak count of 6) as it feeds on intertidal mud and was therefore widespread in the survey area.

Turnstone

5.1.4.24. Turnstone were commonly recorded at high tide surveys with a peak count of 66 individuals in January 2018. During high tide this species were observed feeding around shingle and individuals are pushed towards the harbour wall by the rising tide Turnstone were less regularly recorded at low tide although a peak count of 34 individuals occurred in October 2017.

Sandwich tern

5.1.4.25. This migratory species is a qualifying feature of the Chichester and Langstone Harbour SPA as a breeding species and was seen early in the survey period (October and November 2017) before vacating the area for its winter quarters. It was observed only at low tide, with a peak count of six individuals.

Table 5.2 - Results of 2017/2018 intertidal field surveys by month and tide phase[5]

Common name	Latin name	Oct Low Tide	Oct High Tide	Nov Low Tide	Nov High Tide	Dec Low Tide	Dec High Tide	Jan Low Tide	Jan High Tide	Feb Low Tide	Feb High Tide	Mar Low Tide	Mar High Tide	Low Tide Peak Count	High Tide Peak Count	Total Obs.
Dark-bellied brent goose	*Branta bernicla bernicla*	408	172	617	333	970	95	667	795	1598	946	715	967	1598	967	8283
Shelduck	*Tadorna tadorna*	0	0	6	45	38	7	45	19	66	0	29	5	66	45	260
Teal	*Anas crecca*	1	0	23	0	46	33	2	8	50	27	0	16	50	33	206
Pintail	*Anas acuta*	0	0	0	0	18	4	0	1	75	2	53	6	75	6	159
Shoveler	*Spatula clypeata*	0	0	0	0	2	0	0	0	0	0	0	0	2	0	2
Red-breasted merganser	*Mergus serrator*	0	2	3	12	1	2	4	0	2	5	0	0	4	12	31
Ringed plover	*Charadrius hiaticula*	5	58	12	24	1	0	0	19	31	50	0	0	31	58	200
Grey plover	*Pluvialis squatarola*	10	0	9	0	4	0	19	0	4	1	3	0	19	1	50
Sanderling	*Calidris alba*	0	0	0	2	4	2	0	0	0	0	0	200	4	200	208
Dunlin	*Calidris alpina*	398	1	22	1	404	0	66	0	2014	9	167	0	2014	9	3082
Black-tailed godwit	*Limosa limosa*	75	0	2	0	3	0	0	0	0	0	27	0	75	0	107
Bar-tailed godwit	*Limosa lapponica*	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1
Curlew	*Numenius arquata*	18	0	15	0	16	0	24	0	61	0	15	2	61	2	151
Redshank	*Tringa totanus*	75	0	103	0	51	3	16	5	47	0	25	6	103	6	331
Turnstone	*Arenaria interpres*	34	0	11	0	17	1	6	66	0	3	1	49	34	66	188
Sandwich tern	*Thalasseus sandvicensis*	6	0	2	0	0	0	0	0	0	0	0	0	6	0	8

[5] Shows qualifying features of Chichester and Langstone Harbours SPA only. Appendix 16.14 of the ES provides details of all bird species recorfed during the surveys.

5.1.4.26. Twenty-nine species of bird were observed at the vantage points comprising 3,515 individual bird observations. Broadly, the community of birds in flight was dominated by brent geese.

5.1.4.27. At the northern vantage (Farlington Marshes) point the majority of birds were observed flying north out of the harbour, with dark-bellied brent geese and gulls the dominant bird groups. This is likely due to a strong northerly movement of these birds to roost sites within the harbour at dawn to feeding sites inland to the north. Data does not indicate a return flight into the estuary as few of the vantage point counts were undertaken at dusk, whereas one was always undertaken at close to dawn. The northerly movement takes birds across the A27, a busy carriageway.

5.1.4.28. The southern vantage point showed that a roughly equal east-west movement of birds along Eastney Beach, with the bird community dominated by brent geese and waders (namely large groups of dunlin), with a significant passage of gulls also. The data show that although some birds fly across the beach to reach the harbour behind, most prefer to follow the coastline to access the harbour via Fort Cumberland/Gunner Point.

Onshore Cable Route

5.1.4.29. Breeding bird surveys were undertaken in onshore areas inland of landfall at Eastney Beach, specifically targeting black redstart and Dartford Warbler (APP-420). While these species are listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) neither represent qualifying features of any adjacent European sites. The former species was recorded breeding within the survey area. A suite of further common and widespread breeding bird species were located.

5.1.4.30. Wintering bird surveys of the same area of terrestrial habitats were also undertaken (APP-421). The majority of birds encountered were common and widespread wintering bird species often found in semi-natural habitats. Three species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) were recorded: Dartford Warbler, Cetti's warbler and black redstart.

5.1.4.31. To supplement the surveys of intertidal habitats, parallel surveys of Solent Waders and Brent Goose Strategy sites (SWBGS) were surveyed in parallel (APP-421). The SWBGS as defined in King (2010) and Whitfield (2019) is a conservation partnership project, which aims to conserve the internationally important brent goose and wading bird populations within and around the Special Protection Areas and Ramsar wetlands of the Solent coast. These sites are terrestrial habitats that in effect provide functional linkage to the SPAs including Chichester and Langstone Harbours (See Section 6.3). The distribution of SWBGS sites within or adjacent to the Proposed Development are presented in Plate 5.4.

5.1.4.32. Surveyors visited 22 sites identified in the SWBGS for the South-East Hampshire Coast. Using direct counts, brent geese, gulls and other species were identified and their numbers and behaviour recorded.

Converter Station Area

5.1.4.33. Breeding bird surveys were completed at the Converter Station Area (APP-420). Species present and confirmed breeding consisted of a suite of widespread species typical of the arable and grassland habitats present. No species recorded were relevant to any regional European sites.

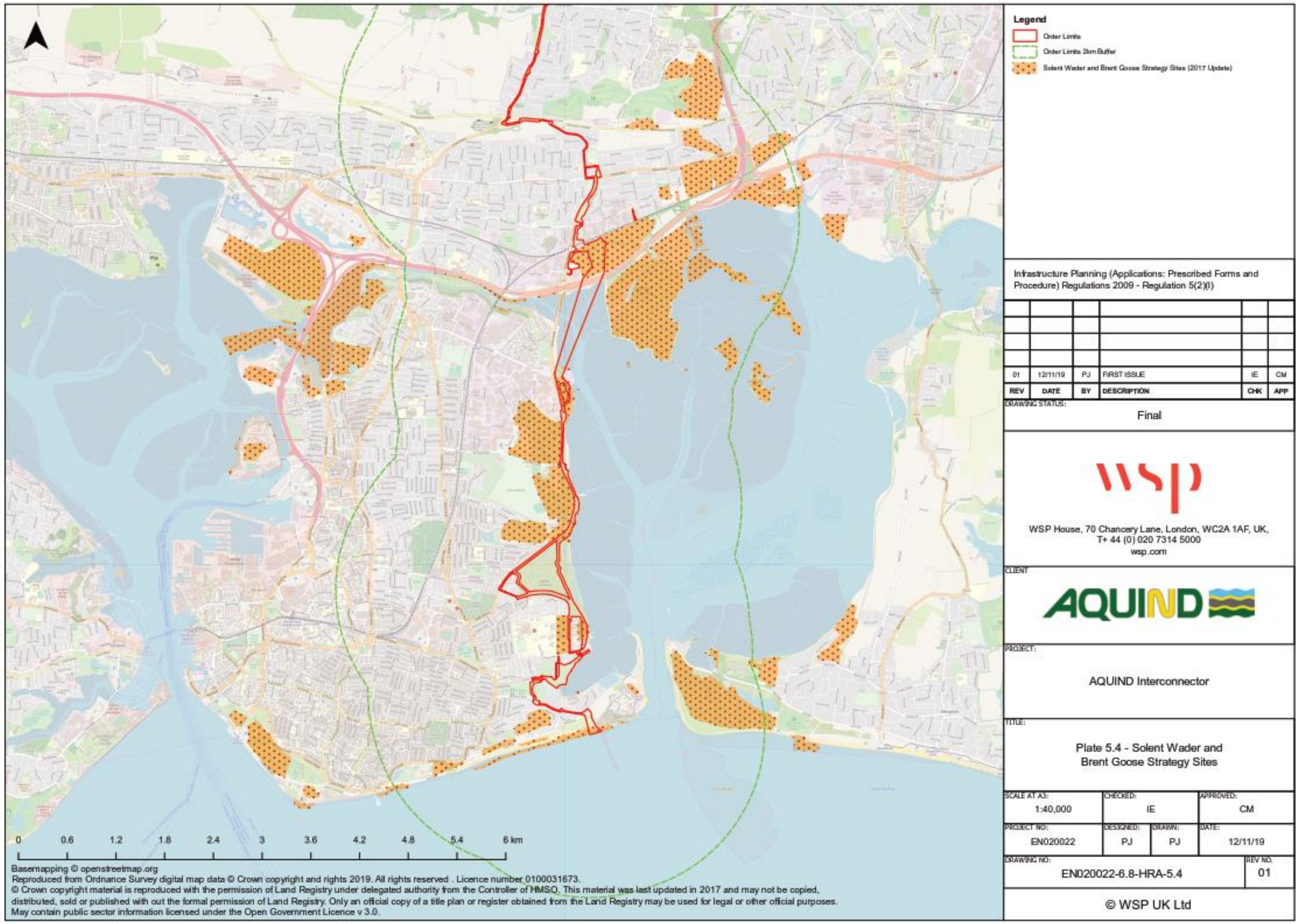

Plate 5.4 – Solent Waders and Brent Goose Strategy Sites

6. IDENTIFICATION OF EUROPEAN SITES AND POTENTIAL EFFECTS

6.1. OVERVIEW

6.1.1.1. Given the linear nature of the Proposed Development and the number of European sites and/or European offshore marine sites that could potentially be affected, an initial pre-LSE screening stage has been introduced into the process. This stage is essentially a site-identification / selection process, which, while it forms part of the overall LSE determination stage of HRA, has been separated out to allow a subsequent focus (in Section 7) on those sites where the Proposed Development is considered to have a potential for a LSE.

6.1.1.2. The criteria used in this first stage of selection takes account of the location of the European sites (including Ramsar sites) in relation to Proposed Development, the ZOI of potential effects of the Proposed Development, and the ecology and distribution of qualifying features. These criteria are described in Table 6.1.

Table 6.1 - Criteria used for initial identification of relevant European sites

	Criteria
1	Proposed Development boundaries overlap with European site.
2	European site supports mobile populations of qualifying features (e.g., Annex I birds, Annex II marine mammals, migratory fish, bats and otters) that may interact with potential effects associated with Proposed Development.
3	European sites and/or qualifying features located within the potential ZOI of effects associated with Proposed Development (e.g., habitat loss/disturbance, noise).
4	European sites with primary reasons or qualifying features for site selection recorded during baseline surveys.

6.1.1.3. This initial screening will exclude or pre-screen out sites where the Proposed Development is considered to have no potential for a LSE. Sites not excluded at this stage are taken forward for a detailed determination of LSE in Section 7.

6.1.1.4. Appendix 1 (APP-501, Rev 002) presents the screening matrices for European Marine Sites (i.e. SPA and SACs) and Appendix 5 (document reference 7.7.10) presents the screening matrices for Ramsars. For Ramsar sites, the features assessed as part of this HRA are those identified under the criteria applied to the designation of the Ramsar site in the relevant Ramsar Information Sheets. The Natural England Designated Sites View[6] states that a decision has been made by Defra and Natural England not to produce Conservation Advice packages for Ramsars, instead focussing on the production of High Level Conservation Objectives. As the provisions of the Habitats Regulations relating to Habitat Regulations Assessments (HRAs) extend to Ramsar sites, Natural England considers the Conservation Advice packages for the overlapping European Marine Site designations to be, in most cases, sufficient to support the management of the Ramsar interests. Assessments presented in Sections 7, 8 and 10 of this document for Ramsars have been undertaken in line with this approach.

6.2. INITIAL IDENTIFICATION OF SITES AND FEATURES – MARINE ENVIRONMENT

6.2.1. OVERVIEW

6.2.1.1. The approach applied to the initial pre-LSE screening stage is analogous to The Crown Estate's Appropriate Assessment of the Round 3 Plan (Entec, 2009). This identified four categories of European and Ramsar sites for which LSE could not be excluded in the marine environment:

- SACs and Ramsar sites designated for Annex II diadromous migratory fish;
- SACs and Ramsar sites designated for Annex II marine mammals;
- SACs and Ramsar sites designated for marine and coastal habitats; and
- SPAs and Ramsar sites designated for Annex I and regularly occurring migratory marine birds.

6.2.1.2. This section should be read in conjunction with Appendix 1 and Appendix 5 of this report (APP 501, Rev 002 and 7.7.10) which presents the PINS screening matrices for sites that have been pre-screened out for further assessment.

6.2.2. ANNEX I HABITATS

6.2.2.1. The potential for connectivity with the Proposed Development is determined based on the outputs of sediment plume dispersion modelling undertaken to assess the plumes of suspended sediment created during sediment disposal operations resulting from sandwave clearance. The maximum extent of the plume extends up to 25 km from the Marine Cable Corridor during dredge disposal activities along an east-west axis. This extent defines the ZOI for Annex I Habitats (Appendix 6.2 – Modelling Technical Report of the ES Volume 3, APP-368).

[6] Available online from: https://designatedsites.naturalengland.org.uk/

Pre-Screening of Designated Sites

6.2.2.2. The UK Marine Cable Corridor overlaps with Solent Maritime SAC and lies 3.3 km and 4.6 km from South Wight Maritime SAC and Solent and the Isle of Wight Lagoons SAC respectively. These sites therefore have the potential for connectivity. Figures 4-1 and 4-2 (APP-492 and 493) illustrate the locations of sites considered.

6.2.2.3. At a minimum distance of 34 km to the south west of the UK Marine Cable Corridor, Wight-Barfleur Reef SAC is positioned outside the ZOI. It is therefore considered that there is no connectivity with Wight-Barfleur Reef SAC and it is screened out of this assessment.

6.2.2.4. Bassurelle Sandbank SAC crosses the EEZ and lies in both UK and French waters. The UK Section, the Bassurelle sandbank, is approximately 60 km east of the UK Marine Cable Corridor, while the French part, Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC, is 58.8 km from the Proposed Development. There is therefore no connectivity with the Bassurelle Sandbank SAC (or associated ZSC) and they are therefore screened out of this assessment.

6.2.2.5. Studland to Portland SAC is approximately 70 km west of the UK Marine Cable Corridor and it is therefore considered that there is no connectivity with this SAC and it is therefore screened out of this assessment.

6.2.2.6. An additional SAC located entirely in French waters with close proximity to the Proposed Development is Littoral Cauchois SAC, however this site is located 52.7 km from the UK Marine Cable Corridor at its nearest point. There is therefore no connectivity with any Annex I habitats present within the Littoral Cauchois SAC, and effects on Annex I habitats within this SAC are screened out of further assessment.

Pre-Screening of Features within Designated Sites

6.2.2.7. Solent Maritime SAC, South Wight Maritime SAC and Solent and Isle of Wight Lagoons are large sites which are not fully encompassed within the ZOI. As such, a detailed assessment of connectivity is undertaken to determine connectivity at a qualifying feature level (see Table 6.2).

Table 6.2 - Pre-screening of Annex I Habitat Qualifying Features

Site	Qualifying Feature
Solent Maritime SAC	Terrestrial features have no connectivity with the proposed marine activities. There is no potential for LSE and these features are therefore screened out on this basis. This includes **annual vegetation of drift lines [1210], perennial vegetation of stony banks [1220], shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes") [2120]** and **Desmoulin's whorl snail (*Vertigo moulinsiana*) [1016]**.
	Coastal lagoons [1150] within the Solent Maritime SAC are located at a minimum distance of 8 km from the Proposed Development. The lagoons are however isolated from open waters by means of a sluice or seawall and therefore have no connectivity with the proposed activities, precluding the possibility of LSE, and are therefore screened out of the assessment.
	Estuaries [1130] are in close proximity to proposed activities and within the likely ZOI of the passive sediment plume. Connectivity cannot be excluded, and therefore Estuaries will be assessed for LSE within the assessment.
	Sandbanks which are slightly covered by sea water all the time [1110] are located at the border of the intertidal and subtidal zones within the Marine Cable Corridor with a potential minimum distance of 0.24 km to the HDD entry/exit location (between KP1 and KP1.6). Connectivity cannot therefore be excluded, and Sandbanks which are slightly covered by sea water all the time will be considered for LSE within the assessment.
	Mudflats and sandflats not covered by seawater at low tide [1140] are located within the Marine Cable Corridor with a potential minimum distance of 0.2 km to the HDD entry/exit location (between KP1 and KP1.6). Connectivity cannot therefore be excluded, and Mudflats and sandflats not covered by seawater at low tide will be considered for LSE within the assessment.
	***Spartina* swards [1320].** Solent Maritime is the only site for smooth cord-grass *Spartina alterniflora* in the UK and is one of only two sites where significant amounts of small cord-grass *S. maritima* are found. It is also one of the few remaining sites for Townsend's cord-grass (*S. x townsendii)* and holds extensive areas of common cord-grass *Spartina anglica*, all four taxa thus occurring here in close proximity. Connectivity cannot be excluded, and therefore this feature will be assessed for LSE within the assessment.
	Atlantic salt meadows [1330]. Solent Maritime is a composite site composed of a large number of separate areas of saltmarsh. In contrast to the Severn estuary, the salt meadows at this site are notable as being representative of the ungrazed type and support a different range of communities dominated by sea-purslane (*Atriplex portulacoides)*, common sea-lavender (*Limonium vulgare)* and thrift (*Armeria maritima)*. Connectivity cannot be excluded, and therefore this feature will be assessed for LSE within the assessment.
	***Salicornia* and other annuals colonising mud and sand [1310]** for which the area is considered to support a significant presence. Connectivity cannot be excluded, and therefore this feature will be assessed for LSE within the assessment.
South Wight Maritime SAC	Terrestrial features have no connectivity with marine activities and there is no potential for LSE. This applies to **Vegetated sea cliffs of the Atlantic and Baltic Coasts [1230]** and it is therefore screened out of the assessment.
	Submerged or partially submerged sea caves [8330] occur intertidally in the chalk cliffs at the western end of the site between Alum Bay and Freshwater Bay (minimum 37 km from the Marine Cable Corridor, 50 km by sea) and are outside of the ZOI. Intertidal sea caves are also found at the base of Culver Cliff on the Isle of Wight, to the west of the Marine Cable Corridor at a minimum distance of 10 km. Connectivity cannot therefore be excluded and submerged or partially submerged sea caves will be considered for LSE within the assessment.
	Reefs [1170] are located in the subtidal area to the east of the Isle of Wight, at a minimum distance of 3.3 km from the Marine Cable Corridor. Connectivity cannot therefore be excluded, and Reefs will be considered for LSE within the assessment.
Solent and Isle of Wight Lagoons SAC	Located at a distance of 5 km from the Marine Cable Corridor, the Solent and Isle of Wight Lagoons SAC includes fourteen coastal lagoons (**Coastal Lagoons [1150])**, the closest of which is located in Langstone Harbour (5 km), followed by Gilkicker (7 km), and four at Bembridge on the Isle of Wight (8 km). These are marine features, but they are isolated from the sea by a sluice or seawall, receiving seawater either through percolation, culverts or spring tides. It is therefore considered that the Solent and Isle of Wight Lagoons site does not have connectivity with the Proposed Development and is therefore screened out of the assessment.

Summary of Pre-screening

6.2.2.8. Table 6.3 shows where there is no connectivity between the Proposed Development and an SAC and its features, and also those sites/features for which LSE cannot be discounted.

Table 6.3 - European sites designated for Annex I habitats for which no connectivity exists and also for sites where LSE cannot be discounted

European Site	Approximate Distance from the Proposed Development (km)	Qualifying features	Pre-Screened in?
Solent Maritime SAC	0.0	Estuaries [1130]	Yes
		Mudflats and sandflats (not submerged at low tide) [1140]	Yes
		Sandbanks (slightly covered by seawater all the time) [1110]	Yes
		Shifting dunes along the shoreline [2120]	No – terrestrial feature, no connectivity to marine activities
		Coastal lagoons [1150]	No – no connectivity due to isolation from sea and distance from activities
		Annual vegetation of drift lines [1210]	No – terrestrial feature, no connectivity to marine activities
		Perennial vegetation of stony banks [1220]	No – terrestrial feature, no connectivity to marine activities
		Salicornia and other annuals colonising mud and sand [1310]	Yes
		Spartina swards [1320].	Yes
		Atlantic salt meadows [1330].	Yes
		Desmoulin's whorl snail (*Vertigo moulinsiana*) [1016]	No – terrestrial species, no connectivity to marine activities

European Site	Approximate Distance from the Proposed Development (km)	Qualifying features	Pre-Screened in?
South Wight Maritime SAC	3.3	Reefs [1170]	Yes
		Vegetated sea cliffs of the Atlantic and Baltic Coasts [1230]	No – terrestrial feature, no connectivity to marine activities
		Submerged or partially submerged sea caves [8330]	Yes
Solent and Isle of Wight Lagoons SAC	4.6	Coastal lagoons [1150]	No – no connectivity due to isolation from sea and distance from activities
Wight-Barfleur Reef SAC	34.0	Reefs [1170]	No – outside the ZOI
Bassurelle Sandbank SAC	60.0	Sandbanks (slightly covered by seawater all the time) [1110]	No – outside the ZOI
Studland to Portland SAC	70.0	Reefs [1170]	No – outside the ZOI
Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC	58.8	Annex I habitats	No – outside the ZOI
Littoral Cauchois SAC	52.7	Annex I habitats	No – outside the ZOI

6.2.3. ANNEX II DIADRAMOUS MIGRATORY FISH

6.2.3.1. The Proposed Development does not overlap the boundary of any European site which lists Annex II diadromous migratory fish as interest features and therefore no direct effects are expected. It is however, within the migratory range of Annex II fish species from a number of SACs and Ramsars on both the English and French side of the Channel. Pre-screening of sites for potential connectivity considered that all UK sites designated for Annex II diadromous fish species which connect to the

Channel via estuaries or rivers may have connectivity to the project (Figure 4.3, APP-494). For designated sites in French waters, all designated sites within the eastern Channel with Annex II diadromous fish features were considered to have potential for connectivity (Figure 4.4, APP-495, Rev 03). Those sites in French waters, west of the Bay of Seine were considered too distant to have potential for connectivity with the project.

6.2.3.2. Nine European sites which list Annex II diadromous migratory fish have been identified as requiring further assessment due to potential connectivity with the project (Table 6.4).

Table 6.4 - Designated Sites with Potential for LSE on Annex II diadromous migratory fish

European Site	Approximate Distance from the Proposed Development (km)	Qualifying Features	Pre-Screened In?
River Itchen SAC	27.5	Salmon	Yes
River Avon SAC	51.4	Salmon Sea lamprey	Yes
Littoral Cauchois SAC	52.7	Twaite shad Sea lamprey River lamprey	Yes
Estuaires et Littoral Picards (Baies de Somme et d'Authie) SAC/Baie de Somme Ramsar	84.6	River lamprey	Yes
Baie de Canche et Couloir des trois Estuaires SAC	86.5	Allis shad Sea lamprey River lamprey Salmon	Yes
Estuaire de la Seine ZSC/Marais Vernier Ramsar	90	Salmon Twaite shad Sea lamprey River lamprey	Yes
Baie de Seine Orientale SAC	90.9	Allis shad Twaite shad Sea lamprey River lamprey Salmon	Yes
River Axe SAC	168	Sea lamprey	Yes
Plymouth Sound and Estuaries SAC	229	Allis shad	Yes

6.2.4. MARINE MAMMALS

6.2.4.1. The potential for connectivity between the Proposed Development and SACs/Ramsars for which marine mammals are a primary reason for site selection/qualifying feature was assessed based on whether the Proposed Development fell within the likely foraging range of seals or likely population range of cetaceans using these SACs[7] (Appendix 2 of this report, APP-502 and Figures 4-5 and 4-6, APP-496 and 497). Foraging range information for seals came from telemetry studies (mainly Sharples *et al*., 2012, Russell *et al*., 2017 and Vincent *et al*., 2017). However, telemetry studies have not been conducted for cetaceans in either the UK or France. Therefore, information on likely population range for cetacean species which are a feature of the closest SACs to the Proposed Development was used. For bottlenose dolphins this mainly came from individual identification (photo-ID) data (Pesante *et al*., 2008; Brereton *et al*., 2016). For harbour porpoises the Small Cetaceans in European Atlantic Waters and the North Sea ('SCANS') and SCANS II data (model-based density surfaces) were used (Hammond *et al*., 2013); these have yet to be released for SCANS III.

6.2.4.2. The closest UK SACs for each Annex II marine mammal species were as follows:

- Grey seal – Pembrokeshire Marine (542 km);
- Harbour seal – The Wash and North Norfolk Coast (370 km)[8];
- Bottlenose dolphin – Cardigan Bay (618 km); and
- Harbour porpoise – Southern North Sea (137 km; Figure 4.5).

6.2.4.3. None of the UK marine mammal SACs considered were deemed to be close enough to the Proposed Development for there to be potential for connectivity (Appendix 2[9]) and have therefore been pre-screened out.

6.2.4.4. There is, however, considered to be potential for connectivity between the Proposed Development and seven French SACs which have been designated for marine mammals and one French Ramsar, for which grey and harbour seals were listed as 'species whose presence explains the international importance of the site', which are located in the eastern Channel (Table 6.5 and Figure 4.6). This is because the Proposed Development is considered to fall within the likely population range of cetacean species and/or the likely foraging range of seal species which are features of these SACs/Ramsars. Due to the potential for transboundary effects, these SACs/Ramsars (Table 6.5) have been pre-screened in for further assessment.

[7] Ramsar sites for which marine mammals were listed as 'species whose presence explains the international importance of the site' were also considered.
[8] The Wash Ramsar is also present at this location.
[9] Natural England confirmed that they agreed with the conclusions of this document on 03/05/2019 by e-mail.

Table 6.5 - Designated Sites with marine mammal features where there is potential for LSE

European Site	Approximate closest distance to the Proposed Development by sea (km)	Qualifying Features	Pre-Screened In?
Littoral Cauchois SAC	53	Bottlenose dolphin Harbour porpoise Grey seal Harbour seal	Yes
Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC	59	Harbour porpoise Grey seal Harbour seal	Yes
Baie de Canche et couloir des trois estuaires SAC	85	Harbour porpoise Grey seal Harbour seal	Yes
Estuaires et littoral picards (baies de Somme et d'Authie) SAC/Baie de Somme Ramsar[10]	87	Bottlenose dolphin Harbour porpoise Grey seal Harbour seal	Yes
Estuaire de la Seine SAC[11]	90	Harbour porpoise Grey seal Harbour seal	Yes
Baie de Seine orientale SAC	91	Bottlenose dolphin Harbour porpoise Grey seal Harbour seal	Yes
Récifs Gris-Nez Blanc-Nez SAC	104	Harbour porpoise Grey seal Harbour seal	Yes
Southern North Sea SAC	137	Harbour porpoise	No
The Wash and North Norfolk Coast SAC	370	Harbour seal	No
Pembrokeshire Marine SAC	542	Grey seal	No

[10] Of the four marine mammal features of the SAC which is in the same location, only grey seal and harbour seal are listed as 'species whose presence explains the international importance of the site' for the Baie de Somme Ramsar.
[11] The Marais Vernier et Vallée de la Risle maritime Ramsar, which lists harbour seal under 'Noteworthy fauna', is in the same location as this SAC.

European Site	Approximate closest distance to the Proposed Development by sea (km)	Qualifying Features	Pre-Screened In?
Cardigan Bay SAC	618	Bottlenose dolphin Grey seal	No

6.2.5. MARINE ORNITHOLOGY

6.2.5.1. The Birds Directive provides for the protection, management and control of all species of naturally occurring wild birds in the European territory of Member States. SPAs are strictly protected sites classified in accordance with Article 4 of the EC Birds Directive (2009). They are classified for rare and vulnerable birds (as listed on Annex I of the Directive) and for regularly occurring migratory species. UK Government policy states that Ramsar sites (designated under the Ramsar Convention 1971) and pSPAs are afforded the same protection as SPAs for the purpose of considering development proposals that may affect them.

6.2.5.2. The Proposed Development passes through the Solent and Dorset Coast SPA from the Landfall at Eastney out to approximately to KP16. This site is proposed to protect the marine foraging areas of qualifying interest features from colonies within adjacent classified SPAs: Poole Harbour SPA, Solent and Southampton Water SPA/Ramsar and Chichester and Langstone Harbour SPA/Ramsar. The qualifying interest features are common tern, Sandwich tern and little tern, with the site supporting more than 1% of the Great British breeding population of each species. Given that the UK Marine Cable Corridor passes through this SPA, there is potential for LSE and this site has been pre-screened in for further assessment.

6.2.5.3. Table 6.6 summarises the pre-screening on the Solent and Dorset Coast SPA features, in addition to other marine ornithology features known to be present within the study area.

6.2.5.4. The potential for LSE on features which are present above MLWS (e.g. terrestrial and intertidal species) is assessed separately in Section 6.3 (Onshore). It is considered that there is no route to impact on these features from activities within the UK Marine Cable Corridor and they are therefore not considered further within the marine section.

6.2.5.5. Where a mean-maximum foraging range, or more recent tracking data (where available), has been used to assess the potential for breeding seabirds to interact with the Proposed Development, the distance calculated is based on the boundary of the SPA/Ramsar site to the boundary of the Proposed Development.

6.2.5.6. In discussions with Natural England, pressures and effects on most supporting habitats were screened out of the assessment but it was requested that the potential for LSE on supporting habitat (water column) was considered in addition to marine ornithology features for UK SPA and Ramsar sites (see Appendix 4 APP-504 and Consultation Report APP-025).

6.2.5.7. Following the initial pre-LSE screening stage outlined in Table 6.6 below, the following European sites have been screened out from further assessment as due to the distance of the sites from the Proposed Development and the mean-maximum foraging range of their features, it is considered that there is no potential for connectivity with the Proposed Development (see Figures 4.7 and 4.8):

- Dungeness, Romney Marsh and Rye Bay SPA/Ramsar site;
- Poole Harbour SPA; and
- Estuaire et Marais de la Basse Seine SPA/Marais Vernier Ramsar.

Table 6.6 - Potential for LSE on SPA and Ramsar marine ornithological features

Relevant SPA/Ramsar	Indicative distance from SPA/Ramsar to Proposed Development	Features present in the study area	Use of Proposed Development	Mean-maximum breeding season foraging range (Thaxter *et al*., 2012)	Pre-screened in?
Solent and Dorset Coast SPA	0.0 km*	Sandwich tern (B)	Summer visitor present in moderate densities within inshore waters between March and September.	49.0 km	Yes, qualifying feature within foraging distance of the Proposed Development.
		Common tern (B)	Summer visitor present in moderate densities within inshore waters between April and September.	15.2 km	Yes, qualifying feature within foraging distance of the Proposed Development.
		Little tern (B)	Summer visitor present in low to moderate densities within coastal waters between April and September.	6.3 km	Yes, qualifying feature within foraging distance of the Proposed Development.
		Supporting habitat (water column)	N/A	N/A	Yes, supporting habitat of qualifying features.
Chichester and Langstone Harbours SPA/Ramsar site	0.1 km	Red-breasted merganser (W)	Present in inshore waters during the winter, with concentrations in Chichester, Langstone and Portsmouth Harbours.	N/A	Yes, qualifying feature within foraging distance of the Proposed Development.
		Sandwich tern (B)	Summer visitor present in moderate densities within inshore waters between March and September.	49.0 km	Yes, qualifying feature foraging distance of the Proposed Development.
		Common tern (B)	Summer visitor present in moderate densities within inshore waters between April and September.	15.2 km	Yes, qualifying feature within foraging distance of the Proposed Development.
		Little tern (B)	Summer visitor present in low to moderate densities within coastal waters between April and September.	6.3 km	Yes, qualifying feature within foraging distance of the Proposed Development.
		Supporting habitat (water column)	N/A	N/A	Yes, supporting habitat of qualifying features.
Portsmouth Harbour SPA/Ramsar site	4.9 km	Red-breasted merganser (W)	Present in inshore waters during the winter, with concentrations in Chichester, Langstone and Portsmouth Harbours.	N/A	Yes, qualifying feature within foraging distance of the Proposed Development.
		Supporting habitat (water column)	N/A	N/A	Yes, supporting habitat of qualifying features.
Solent and Southampton Water SPA/Ramsar site	6.6 km	Sandwich tern (B)	Summer visitor present in moderate densities within inshore waters between March and September.	49.0 km	Yes, qualifying feature within foraging distance of the Proposed Development.
		Common tern (B)	Summer visitor present in moderate densities within inshore waters between April and September.	15.2 km	Yes, qualifying feature within foraging distance of the Proposed Development.
		Roseate tern (B)	Summer visitor present in very low densities within inshore waters between May and August.	16.6 km	Yes, qualifying feature within foraging distance of the Proposed Development.

Relevant SPA/Ramsar	Indicative distance from SPA/Ramsar to Proposed Development	Features present in the study area	Use of Proposed Development	Mean-maximum breeding season foraging range (Thaxter *et al*., 2012)	Pre-screened in?
		Little tern (B)	Summer visitor present in low to moderate densities within coastal waters between April and September.	6.3 km	Yes, qualifying feature within foraging distance of the Proposed Development.
		Mediterranean gull (B)	Present year-round in low-moderate densities, predominantly in coastal waters.	20.0 km	Yes, qualifying feature within foraging distance of the Proposed Development.
		Supporting habitat (water column)	N/A	N/A	Yes, supporting habitat of qualifying features.
Pagham Harbour SPA/Ramsar site	9.5 km	Common tern (B)	Summer visitor present in moderate densities within inshore waters between April and September.	15.2 km	Yes, qualifying feature within foraging distance of the Proposed Development.
		Little tern (B)	Summer visitor present in low to moderate densities within coastal waters between April and September.	6.3 km	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Supporting habitat (water column)	N/A	N/A	Yes, supporting habitat of qualifying features.
Littoral-Seino Marin SPA	30.6 km	Common scoter (W)	Present from early autumn through the winter months at low densities, largely in inshore waters. Higher densities occur elsewhere along the southern coast of England.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Eider (W)	Present in low densities largely in inshore waters during mid-winter.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Red-throated diver (W)	Present during winter at a low density in coastal waters.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Great northern diver (W)	Scarce winter visitor, present in very low densities in coastal waters.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Black-throated diver (W)	Scarce winter visitor, present in very low densities in coastal waters.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Great crested grebe (W)	Present in inshore waters during winter at a low density	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Black-necked grebe (W)	Present along the Hampshire and Dorset coastlines, particularly in Langstone and Poole Harbours	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Slavonian grebe (W)	Present along the Sussex coast in relatively low densities, particularly in Pagham Harbour.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Red-breasted merganser (W)	Present in inshore waters during the winter, with concentrations in Chichester, Langstone and Portsmouth Harbours.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Fulmar (B)	Present throughout the Channel year-round, but widely distributed at sea, with relatively low densities present in study area.	400.0 km	Yes, qualifying feature within foraging distance of the Proposed Development.

Relevant SPA/Ramsar	Indicative distance from SPA/Ramsar to Proposed Development	Features present in the study area	Use of Proposed Development	Mean-maximum breeding season foraging range (Thaxter *et al.*, 2012)	Pre-screened in?
		Manx shearwater (P)	Peak numbers present during passage periods with low densities also present during the breeding season.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Balearic shearwater (P)	Low densities present during passage, peaking in autumn.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Storm petrel (P)	Low densities present year-round, peaking during migration.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Gannet (W)	Moderate densities present throughout the Channel year-round.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Cormorant (B)	Low-moderate densities present year-round in inshore waters.	25.0 km	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Shag (B)	Low densities present year-round in inshore waters	14.5 km	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Great skua (P)	Low densities present during passage.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Arctic skua (P)	Low densities present during passage.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Pomarine skua (P)	Very low densities present during passage.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Sandwich tern (P)	Summer visitor present in moderate densities within inshore waters between March and September.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Common tern (P)	Summer visitor present in moderate densities within inshore waters between April and September.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Arctic tern (P)	Low densities present during passage as birds breeding at more northerly colonies pass through the Channel.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Little tern (P)	Summer visitor present in low to moderate densities within coastal waters between April and September.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Great black-backed gull (B)	Present year-round in low-moderate densities throughout the Channel.	61.1 km**	Yes, qualifying feature within foraging distance of the Proposed Development.
		Herring gull (B)	Present year-round in moderate densities throughout the Channel.	61.1 km	Yes, qualifying feature within foraging distance of the Proposed Development.
		Lesser black-backed gull (W)	Present year-round in moderate densities throughout the Channel.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Kittiwake (B)	Present throughout the Channel year-round with higher densities present in the winter.	60.0 km	Yes, qualifying feature within foraging distance of the Proposed Development.

Relevant SPA/Ramsar	Indicative distance from SPA/Ramsar to Proposed Development	Features present in the study area	Use of Proposed Development	Mean-maximum breeding season foraging range (Thaxter *et al*., 2012)	Pre-screened in?
		Mediterranean gull (W)	Present year-round in low-moderate densities, predominantly in coastal waters.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Little gull (W)	Present throughout the Channel in low densities during migration.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Guillemot (W)	Present throughout the Channel year-round in moderate densities. Higher densities present in the winter.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Razorbill (W)	Present throughout the Channel year-round in low-moderate densities. Higher densities present in the winter.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
Dungeness, Romney Marsh and Rye Bay SPA/Ramsar site	61.0 km	Sandwich tern (B)	Summer visitor present in moderate densities within inshore waters between March and September.	49.0 km	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Common tern (B)	Summer visitor present in moderate densities within inshore waters between April and September.	15.2 km	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Little tern (B)	Summer visitor present in low to moderate densities within coastal waters between April and September.	6.3 km	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Mediterranean gull (B)	Present year-round in low-moderate densities, predominantly in coastal waters.	20.0 km	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Supporting habitat (water column)	N/A	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
Poole Harbour SPA	63.8 km	Sandwich tern (B)	Summer visitor present in moderate densities within inshore waters between March and September.	49.0 km	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Common tern (B)	Summer visitor present in moderate densities within inshore waters between April and September.	15.2 km	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Mediterranean gull (B)	Present year-round in low-moderate densities, predominantly in coastal waters.	20.0 km	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Supporting habitat (water column)	N/A	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
Estuaire et Marais de la Basse Seine SPA/ZPS	86.9 km	Common scoter (W)	Present from early autumn through the winter months at low densities, largely in inshore waters. Higher densities occur elsewhere along the southern coast of England.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Eider (W)	Present in low densities largely in inshore waters during mid-winter	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.

Relevant SPA/Ramsar	Indicative distance from SPA/Ramsar to Proposed Development	Features present in the study area	Use of Proposed Development	Mean-maximum breeding season foraging range (Thaxter *et al.*, 2012)	Pre-screened in?
		Red-throated diver (W)	Present during winter at a low density in coastal waters.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Great northern diver (W)	Scarce winter visitor, present in very low densities in coastal waters.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Black-throated diver (W)	Scarce winter visitor, present in very low densities in coastal waters.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Cormorant (W)	Low-moderate densities present year-round in inshore waters.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Great crested grebe (W)	Present in inshore waters during winter at a low density	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Red-necked grebe (W)	Present in inshore waters during winter at a low density	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Slavonian grebe (W)	Present along the Sussex coast in relatively low densities, particularly in Pagham Harbour.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Red-breasted merganser (W)	Present in inshore waters during the winter, with concentrations in Chichester, Langstone and Portsmouth Harbours.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Great skua (P)	Low densities present during passage.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Arctic skua (P)	Low densities present during passage.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Sandwich tern (P)	Summer visitor present in moderate densities within inshore waters between March and September.	49.0 km	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Common tern (P)	Summer visitor present in moderate densities within inshore waters between April and September.	15.2 km	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Arctic tern (P)	Low densities present during passage as birds breeding at more northerly colonies pass through the Channel.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Mediterranean gull (P)	Present year-round in low-moderate densities, predominantly in coastal waters.	20.0 km	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Little gull (P)	Present throughout the Channel in low densities during migration.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Guillemot (W)	Present throughout the Channel year-round in moderate densities. Higher densities present in the winter.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Razorbill (W)	Present throughout the Channel year-round in low-moderate densities. Higher densities present in the winter.	N/A	No, no connectivity between qualifying feature and Proposed Development due to distance.

Relevant SPA/Ramsar	Indicative distance from SPA/Ramsar to Proposed Development	Features present in the study area	Use of Proposed Development	Mean-maximum breeding season foraging range (Thaxter *et al*., 2012)	Pre-screened in?
Alderney West Coast and Burhou Islands Ramsar site	142.0 km	Storm petrel (B)	Peak numbers present during passage periods with low densities also present during the breeding season.	>65.0 km	Yes, qualifying feature within foraging distance of the Proposed Development.
		Gannet (B)	Gannets are present in the Channel year-round, being one of the most frequently recorded species encountered. Peak numbers occur during the breeding season	229.4 km**	Yes, qualifying feature within foraging distance of the Proposed Development.
		Great black-backed gull (B)	Present year-round in low-moderate densities throughout the Channel.	61.1 km***	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Cormorant (B)	Low-moderate densities present year-round in inshore waters.	25.0 km	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Shag (B)	Low densities present year-round in inshore waters	14.5 km	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Herring gull (B)	Present year-round in moderate densities throughout the Channel.	61.1 km	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Lesser black-backed gull (B)	Present year-round in moderate densities throughout the Channel.	141.0 km	Yes, qualifying feature within foraging distance of the Proposed Development.
		Kittiwake (B)	Present throughout the Channel year-round with higher densities present in the winter. This species is no longer present within this Ramsar (D. Clifford 2019, pers. comm.).	60.0 km	No, no connectivity between qualifying feature and Proposed Development due to distance and species no longer being present within the Ramsar.
		Guillemot (B)	Present throughout the Channel year-round in moderate densities. Higher densities present in the winter.	84.2 km	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Razorbill (B)	Present throughout the Channel year-round in low-moderate densities. Higher densities present in the winter.	48.5 km	No, no connectivity between qualifying feature and Proposed Development due to distance.
		Puffin (B)	Present throughout the Channel year-round in low-moderate densities. Higher densities present in the winter.	105.4 km	No, no connectivity between qualifying feature and Proposed Development due to distance.

Key: (B) = breeding; (W) = wintering; (P) = passage; * = Proposed Development overlaps with this designated site; ** = considered to be conservative based on mean-maximum foraging ranges of gannets breeding at Les Etacs and Ortac, Alderney, as presented in Warwick-Evans *et al*., (2016); *** = in the absence of a species-specific mean-max foraging range, herring gull was used as a proxy for great black-backed gull. Herring gull was considered to be the most suitable model species, as lesser black-backed gull (*Larus fuscus*) is a long distant migrant (unlike great black-backed gull) and is morphologically adapted to longer flights (Snow & Perrins 1998; Klaassen *et al*., 2011). The mean maximum foraging range cited for herring gull is 61.1 ± 44 km (Thaxter *et al*., 2012).

6.3. INITIAL IDENTIFICATION OF SITES AND FEATURES – ONSHORE ENVIRONMENT

6.3.1. SITES DESIGNATED FOR ANNEX I HABITATS

6.3.1.1. Any site that includes Annex I habitats that is directly affected by the Proposed Development would be screened into assessment along with all its interest features. In this instance, 'directly' means where the Onshore Cable Corridor search area passes through the European site.

6.3.1.2. It is expected that works in the onshore environment from the Proposed Development (see Section 3.4) will have limited connectivity to any habitats that are not immediately adjacent through a lack of hydrological connectivity and the nature of the construction methodologies applied.

6.3.1.3. An element of the onshore cable corridor also crosses the Solent Maritime SAC (Plate 5.2) and there is therefore potential for connectivity. The SAC is a large site that is not fully encompassed by any ZOI from the onshore elements of the Proposed Development. Features that are present below MLWS are fully assessed under Annex I habitats in the marine environment sections – see Section 6.2.2.

6.3.1.4. Further European sites in the marine and coastal environment that have been identified, include Solent and Isle of Wight Lagoon SAC (6 km from the onshore cable corridor) and South Wight Maritime SAC (8.1 km from the Onshore Cable Corridor). These sites are both fully considered within the marine environment sections of this HRA – see Section 6.2.2.

6.3.1.5. Butser Hill SAC lies 5.6 km from the Converter Station Area. This European Site is situated on the east Hampshire chalk which forms part of the South Downs. Much of the site consists of CG2 *Festuca ovina – Avenula pratense* grassland. The site has a varied range of slope gradients and aspects which has a strong influence on the vegetation composition. A particular feature of the site is its lower plant assemblage. It has the richest terricolous lichen flora of any chalk grassland site in England, and also supports the distinctive *Scapanietum asperae* or southern hepatic mat association of leafy liverworts and mosses on north-facing chalk slopes. This association is very rare in the UK and Butser Hill supports the largest known example. The site exhibits various transitions between semi-natural dry grassland, chalk heath, mixed scrub and 91J0 *Taxus baccata* woods.

6.3.1.6. Considering the distance between the Proposed Development and Butser Hill SAC there is concluded to be no connectivity and no potential for Likely significant effects.

6.3.2. SITES DESIGNATED FOR ANNEX II SPECIES

6.3.2.1. Any site that includes Annex II species that is directly affected by the Proposed Development would be screened into the assessment along with its Annex II species features. On this basis the term 'directly' refers to where the onshore elements of the Proposed Development are within or directly adjacent to the European Site.

6.3.2.2. Further consideration is given to Annex II ecological features that are distinctly mobile which therefore have a wider potential for connectivity with the Proposed Development. CIEEM (2016) provides the appropriate guidance for taking into account species distribution and ecology. Areas of search for these species include:

- Bats – Sites within 10km of the onshore elements of the Proposed Development would be screened into the Assessment; and
- Otters – Sites within 5 km of the onshore elements Proposed Development would be screened into the Assessment.

6.3.2.3. No European Site lies within 10 km of the onshore elements of the Proposed Development that supports terrestrial Annex II species.

6.3.3. SITES DESIGNATED FOR ORNITHOLOGICAL FEATURES

6.3.3.1. Any European sites that are directly affected by the Proposed Development have been screened into the assessment along with its ornithological features. As with Annex II features, the term 'directly' refers to where to Sites which overlap or are adjacent to the onshore elements of the Proposed Development.

6.3.3.2. In addition, sites designated for ornithological features which are located within 10 km of the Proposed Development have also been included for assessment. Foraging range of breeding seabirds (e.g. Thaxter *et al*., 2012) has not been included as criteria for screening for the onshore element of the Proposed Development due to the limited potential for interaction with onshore works. These criteria are, however, fundamental in determining screening conclusions with regards to the marine components of the Proposed Development (see Section 6.2.5).

6.3.3.3. The Proposed Development passes through and borders Chichester and Langstone Harbours SPA and is immediately adjacent to the Solent and Dorset Coast SPA. As the SPA is designated for foraging areas for breeding tern species this is considered to have connectivity with the marine elements of the Proposed Development only. A similar consideration is also given to features which are ordinarily present in the marine environment only (i.e. below MLWS) such as red-breasted merganser. These features are fully considered within the marine ornithology sections of this HRA – see Section 6.2.5.

6.3.3.4. Table 6.7 provides a summary of sites and ornithological features that lie within 10 km of the onshore elements of the Proposed Development.

Table 6.7 - Potential for LSE on SPA and Ramsar ornithological features from onshore components of the Proposed Development

Relevant SPA/Ramsar	Distance from SPA/Ramsar to Proposed Development	Features	Potential for LSE?
Chichester and Langstone Harbours SPA/Ramsar site[12]	0.0 km, partly overlapping	Sandwich tern (B*) Little tern (B***) Common tern (B*) Pintail (W*) Shoveler (W*) Wigeon (W*) Turnstone (W*) Dark-bellied brent goose (W***) Sanderling (W*) Dunlin (W***) Ringed Plover (W***) Grey plover (W***) Bar-tailed godwit (W) Black-tailed godwit (W**) Red-breasted merganser (W***) Curlew (W*) Shelduck (W***) Redshank (W***) Waterfowl assemblage (W***)	Yes – onshore elements directly adjacent to the SPA. Red-breasted merganser is however considered to be a feature of relevance only to the assessment of marine ornithology and no LSE is considered with respect to onshore elements of the Proposed Development.
Solent and Dorset Coast SPA	0.0 km, adjacent	Sandwich tern (B) Little tern (B) Common tern (B)	No - This site is proposed to protect the marine foraging areas of qualifying interest features from colonies within adjacent classified SPAs including Chichester and Langstone Harbours SPA and as such no potential connectivity with the onshore components of the Proposed Development are considered to occur.
Portsmouth Harbour SPA/Ramsar site	2.2 km	Dark-bellied brent goose (W***) Dunlin (W*) Black-tailed godwit (W*) Red-breasted merganser (W*)	Yes – while direct impacts to the Site itself are unlikely, features are likely to occur outwith the site adjacent to the Proposed Development. Red-breasted merganser is considered to be a feature of relevance only to the assessment of marine ornithology and no LSE is considered with respect to onshore components of the Proposed Development.
Solent and Southampton Water SPA/Ramsar site	7.1 km	Teal (W***) Dark-bellied brent goose (W***) Ringed plover (W*) Mediterranean gull (B***) Black-tailed godwit (W***) Little tern (B*) Roseate tern (B*) Common tern (B*) Sandwich tern (B*) Waterfowl Assemblage (W***)	No - although Solent and Dorset coast SPA features include provision for foraging tern species from this SPA, these are considered not likely to reach the SPA area adjacent to the onshore element of the Proposed Development as detailed in the Departmental Brief for the SPA (Natural England, 2016). With regards wintering bird features, the SPA/Ramsar is sufficiently distant so that impacts from the onshore element of the Proposed Development are not considered likely.
Key: B – breeding feature; W – wintering feature; P – Passage feature. ; * – feature of SPA and Ramsar; ** – feature of Ramsar only; * – feature of SPA only.**			

[12] Additional species listed on the SPA Review (2001) include Little Egret (P/W), black-tailed godwit (W)

6.4. POTENTIAL EFFECTS – MARINE ENVIRONMENT

6.4.1.1. The following sections should be read in conjunction with Appendix 1 and Appendix 5 (APP-501, Rev 002 and 7.7.10) of this report. Appendix 1 presents the screening matrices for European Marine Sites (e.g. SACs and SPAs) and Appendix 5 presents the screening matrices for Ramsars.

6.4.1.2. For Ramsar sites, the features assessed are those features under the criteria applied to the designation of the Ramsar site in the relevant Ramsar Information Sheets. The Natural England Designated Sites View[13] states that a decision has been made by Defra and Natural England not to produce Conservation Advice packages, instead focussing on the production of High Level Conservation Objectives. As the provisions on the Habitats Regulations relating to HRA extends to Ramsar sites, Natural England considers the Conservation Advice packages for the overlapping European Marine Site designations to be, in most cases, sufficient to support the management of the Ramsar interests. Assessments presented in Sections 7, 8 and 10 of this document for Ramsars have been undertaken in line with this approach.

6.4.2. ANNEX I HABITATS

6.4.2.1. Where there is no connectivity between the Proposed Development and qualifying features of SACs, LSE can be discounted. Features of sites where potential connectivity cannot be discounted have been taken forward to a more detailed LSE screening assessment (see Table 6.3).

6.4.2.2. Natural England's Advice on Operations matrix lists a number of pressures for power cables (laying, burial and protection; operation and maintenance; decommissioning) and cables (HDD) in relation to designated sites (Natural England, 2020). Information on potential pressures associated with cabling activities was available from the Natural England Designated Sites View for Advice on Operations for the following European sites:

- Solent Maritime[14]
- South Wight Maritime[15]

6.4.2.3. Each pressure identified is given a risk level (Medium-High risk or Low risk),assessed against each interest feature of a designated site and an interaction type assigned (S

[13] Available online from: https://designatedsites.naturalengland.org.uk/

[14] https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0030059&SiteName=solent%20maritime&SiteNameDisplay=Solent+Maritime+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality= Dated 13th March 2020

[15] https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0030061&SiteName=south%20wight&SiteNameDisplay=South+Wight+Maritime+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=Dated 13th March 2020

– Sensitive; IE – Insufficient evidence to assess; NA – Not assessed; NS – Not sensitive at the benchmark).

6.4.2.4. For all the UK SACs being considered as part of the LSE screening stage, those pressures (both Medium-High risk or Low risk) for which Annex I habitats have been classed as 'sensitive', 'Insufficient Evidence' or "Not Assessed" have been included in the assessment.

6.4.2.5. Given the broad spectrum of pressures itemised on the Advice on Operations matrix in relation to power cables, identified pressures have been categorised into effects which can then be assessed (Table 6.8).

Table 6.8 - Predicted effects of the marine elements of the Proposed Development on relevant Annex I habitat Qualifying Features [C = construction phase O = operation phase D = decommissioning phase]

Site	Qualifying Feature	Pressure	Effect
Solent Maritime SAC	Estuaries	Abrasion/disturbance of the substrate on the surface of the seabed **(C, O, D)**	Habitat disturbance
		Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion **(C, O, D)**	
		Vibration **(C, O, D)**	
		Changes in suspended solids (water clarity) **(C, O, D)**	Increased Suspended Sediment Concentration (SSC)
		Deoxygenation **(C, O, D)**	
		Nutrient enrichment **(C, O, D)**	
		Organic Enrichment **(C)**	
		Smothering and siltation rate changes (light) **(C, O, D)**	Deposition of sediment (smothering)
		Smothering and siltation rate changes (Heavy) **(C, O)**	
		Transition elements & organo-metal (e.g. TBT) contamination (**C, O, D**)	Resuspension of contaminated sediments
		Habitat structure changes - removal of substratum (extraction) **(C, D)**	Habitat loss
		Physical change (to another seabed type) **(C, O, D)**	
		Physical change (to another sediment type) **(C, O, D)**	
		Physical loss (to land or freshwater habitat) **(C, O)**	
		Litter **(C, O, D)**	Pollution
		Introduction of other substances (solid, liquid or gas) **(C)**	
		Hydrocarbon & Pesticides and Polycyclic Hydrocarbons (‘PAH’) contamination **(C, O, D)**	
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals) **(C, O, D)**	
		Introduction of light **(C, O, D)**	Increased light (Pollution)
		Introduction or spread of invasive non-indigenous species (‘INIS’) **(C, O, D)**	Invasive species
		Barrier to species movement **(C, O)**	Electromagnetic Field (EMF)
		Electromagnetic changes **(O)**	
		Temperature decrease **(O)**	Temperature changes
		Temperature increase **(O)**	
		Water flow (tidal current) changes, including sediment transport considerations **(C, O, D)**	Hydrodynamic changes
		Wave exposure changes **(C)**	
		Emergence regime changes, including tidal level change considerations **(C)**	
	Mudflats and sand flats not submerged at low tide	Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion **(C, O, D)**	Habitat disturbance
		Abrasion/disturbance of the substrate on the surface of the seabed **(C, O, D)**	
		Changes in suspended solids (water clarity) **(C, O, D)**	Increased SSC
		Deoxygenation **(C, O, D)**	
		Nutrient enrichment **(C, O, D)**	
		Organic Enrichment (**C**)	
		Transition elements & organo-metal (e.g. TBT) contamination (**C, O, D**)	Resuspension of contaminated sediments

Site	Qualifying Feature	Pressure	Effect
		Smothering and siltation rate changes (light) **(C, O, D)**	Deposition of sediment (smothering)
		Smothering and siltation rate changes (Heavy) **(C)**	
		Habitat structure changes - removal of substratum (extraction) **(C, D)**	Habitat Loss
		Physical change (to another sediment type) **(C, O, D)**	
		Physical Change (to another Seabed type) **(C)**	
		Physical loss (to land or freshwater habitat) **(C, O)**	
		Litter **(C, O, D)**	Pollution
		Introduction of other substances (solid, liquid or gas) **(C)**	
		Hydrocarbon & PAH contamination **(C, O, D)**	
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals) **(C, O, D)**	
		Introduction of light **(C, O, D)**	Increased light (Pollution)
		Introduction or spread of INIS **(C, O, D)**	Invasive species
		Electromagnetic changes **(O)**	EMF
		Temperature decrease **(O)**	Temperature changes
		Temperature increase **(O)**	
		Water flow (tidal current) changes, including sediment transport considerations **(C, O, D)**	Hydrodynamic changes
		Wave exposure changes **(C)**	
		Emergence regime changes, including tidal level change considerations **(C)**	
	Sandbanks slightly covered by seawater all the time	Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion **(C, O, D)**	Habitat disturbance
		Abrasion/disturbance of the substrate on the surface of the seabed **(C, O, D)**	
		Changes in suspended solids (water clarity) **(C, O, D)**	Increased SSC
		Deoxygenation (C, O, D)	
		Organic Enrichment (C)	
		Nutrient enrichment **(C, O, D)**	
		Smothering and siltation rate changes (light) **(C, O, D)**	Deposition of sediment (smothering)
		Smothering and siltation rate changes (Heavy) **(C)**	
		Transition elements & organo-metal (e.g. TBT) contamination (**C, O, D**)	Resuspension of contaminated sediments
		Habitat structure changes - removal of substratum (extraction) **(C, D)**	Habitat loss
		Physical change (to another seabed type) **(C, O, D)**	
		Physical change (to another sediment type) **(C, O, D)**	
		Physical loss (to land or freshwater habitat) **(C, O)**	
		Litter **(C, O, D)**	Pollution
		Introduction of other substances (solid, liquid or gas) **(C)**	
		Hydrocarbon & PAH contamination **(C, O, D)**	
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals) **(C, O, D)**	
		Introduction of light **(C, O, D)**	Increased light (Pollution)
		Introduction or spread of INIS **(C, O, D)**	Invasive species

Site	Qualifying Feature	Pressure	Effect
		Electromagnetic changes **(O)**	EMF
		Temperature decrease **(O)**	Temperature changes
		Temperature increase **(O)**	
		Water flow (tidal current) changes, including sediment transport considerations **(C, O, D)**	Hydrodynamic changes
		Wave exposure changes **(C,)**	
		Emergence regime changes, including tidal level change considerations **(C)**	
	Spartina swards	Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion **(C, O, D)**	Habitat disturbance
		Abrasion/disturbance of the substrate on the surface of the seabed **(C, O, D)**	
		Vibration **(C, O, D)**	
		Changes in suspended solids (water clarity) **(C, O, D)**	Increased SSC
		Smothering and siltation rate changes (Heavy) **(C)**	Deposition of sediment (smothering)
		Transition elements & organo-metal (e.g. TBT) contamination (**C, O, D**)	Resuspension of contaminated sediments
		Habitat structure changes - removal of substratum (extraction) **(C, D)**	Habitat loss
		Physical change (to another sediment type) **(C, O, D)**	
		Physical loss (to land or freshwater habitat) **(C, O)**	
		Litter **(C, O, D)**	Pollution
		Introduction of other substances (solid, liquid or gas) **(C)**	
		Hydrocarbon & PAH contamination **(C, O, D)**	
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals) **(C, O, D)**	
		Introduction or spread of INIS **(C, O, D)**	Invasive species
		Barrier to species movement **(C, O)**	EMF
		Electromagnetic changes **(O)**	
		Temperature decrease **(O)**	Temperature changes
		Temperature increase **(O)**	
		Emergence Regime Changes **(C)**	Hydrodynamic changes
	Atlantic salt meadows	Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion **(C, O, D)**	Habitat disturbance
		Abrasion/disturbance of the substrate on the surface of the seabed **(C, O, D)**	
		Vibration **(C, O, D)**	
		Changes in suspended solids (water clarity) **(C, O, D)**	Increased SSC
		Smothering and siltation rate changes (Heavy) **(C)**	Deposition of sediment (smothering)
		Transition elements & organo-metal (e.g. TBT) contamination (**C, O, D**)	Resuspension of contaminated sediments
		Habitat structure changes - removal of substratum (extraction) **(C, D)**	Habitat loss
		Physical change (to another sediment type) **(C, O, D)**	
		Physical loss (to land or freshwater habitat) **(C, O)**	
		Litter **(C, O, D)**	Pollution

Site	Qualifying Feature	Pressure	Effect
		Introduction of other substances (solid, liquid or gas) **(C)**	
		Hydrocarbon & PAH contamination **(C, O, D)**	
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals) **(C, O, D)**	
		Introduction or spread of INIS **(C, O, D)**	Invasive species
		Barrier to species movement **(C, O)**	EMF
		Electromagnetic changes **(O)**	
		Temperature decrease **(O)**	Temperature changes
		Temperature increase **(O)**	
		Emergence Regime Changes **(C)**	Hydrodynamic changes
	Salicornia and other annuals colonising mud and sand	Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion **(C, O, D)**	Habitat disturbance
		Abrasion/disturbance of the substrate on the surface of the seabed **(C, O, D)**	
		Vibration **(C, O, D)**	
		Changes in suspended solids (water clarity) **(C, O, D)**	Increased SSC
		Smothering and siltation rate changes (Heavy) **(C)**	Deposition of sediment (smothering)
		Transition elements & organo-metal (e.g. TBT) contamination (**C, O, D**)	Resuspension of contaminated sediments
		Habitat structure changes - removal of substratum (extraction) **(C, D)**	Habitat loss
		Physical change (to another sediment type) **(C, O, D)**	
		Physical loss (to land or freshwater habitat) **(C, O)**	
		Litter **(C, O, D)**	Pollution
		Introduction of other substances (solid, liquid or gas) **(C)**	
		Hydrocarbon & PAH contamination **(C, O, D)**	
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals) **(C, O, D)**	
		Introduction or spread of INIS **(C, O, D)**	Invasive species
		Barrier to species movement **(C, O)**	EMF
		Electromagnetic changes **(O)**	
		Temperature decrease **(O)**	Temperature changes
		Temperature increase **(O)**	
		Emergence Regime Changes **(C)**	Hydrodynamic changes
South Wight Maritime	Reefs	Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion **(C, O, D)**	Habitat disturbance
		Abrasion/disturbance of the substrate on the surface of the seabed **(C, O, D)**	
		Changes in suspended solids (water clarity) **(C, O, D)**	Increased SSC
		Deoxygenation **(C, O, D)**	
		Organic enrichment (C)	
		Nutrient enrichment **(C, O, D)**	
		Transition elements & organo-metal (e.g. TBT) contamination (**C, O, D**)	Resuspension of contaminated sediments

Site	Qualifying Feature	Pressure	Effect
		Smothering and siltation rate changes (light) **(C, O, D)**	Deposition of sediment (smothering)
		Smothering and siltation rate changes (Heavy) **(C)**	
		Habitat structure changes - removal of substratum (extraction) **(C, D)**	Habitat loss
		Physical change (to another seabed type) **(C, O, D)**	
		Physical change (to another sediment type) (**C**)	
		Physical loss (to land or freshwater habitat) **(C, O)**	
		Litter (**C, O, D**)	Pollution
		Introduction of other substances (solid, liquid or gas) **(C)**	
		Hydrocarbon & PAH contamination **(C, O, D)**	
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals) **(C, O, D)**	
		Introduction of light **(C, O, D)**	Increased light (Pollution)
		Introduction or spread of INIS **(C, O, D)**	Invasive species
		Underwater noise changes **(C, O, D)**	Noise and vibration
		Barrier to species movement **(C)**	EMF
		Electromagnetic changes **(O)**	
		Temperature decrease **(O)**	Temperature changes
		Temperature increase **(O)**	
		Water flow (tidal current) changes, including sediment transport considerations **(C, O, D)**	Hydrodynamic changes
		Emergence Regime Changes **(C)**	
		Wave exposure changes **(C)**	
	Submerged or partially submerged sea caves	Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion **(C, O, D)**	Habitat disturbance
		Abrasion/disturbance of the substrate on the surface of the seabed **(C, O, D)**	
		Changes in suspended solids (water clarity) **(C, O, D)**	Increased SSC
		Deoxygenation **(C, O, D)**	
		Nutrient enrichment **(C, O, D)**	
		Smothering and siltation rate changes (light) **(C, O, D)**	Deposition of sediment (smothering)
		Smothering and Siltation rate changes (heavy) (C)	
		Transition elements & organo-metal (e.g. TBT) contamination (**C, O, D**)	Resuspension of contaminated sediments
		Habitat structure changes - removal of substratum (extraction) **(C, D)**	Habitat loss
		Physical change (to another seabed type) **(C, O, D)**	
		Physical loss (to land or freshwater habitat) **(C, O)**	
		Litter (C, O, D)	Pollution
		Hydrocarbon & PAH contamination **(C, O, D)**	
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals) **(C, O, D)**	
		Introduction of light **(C, O)**	Increased light (Pollution)
		Introduction or spread of INIS **(C, O, D)**	Invasive species
		Electromagnetic changes **(O)**	EMF
		Temperature decrease **(O)**	Temperature changes

Site	Qualifying Feature	Pressure	Effect
		Temperature increase **(O)**	
		Water flow (tidal current) changes, including sediment transport considerations **(C, O, D)**	Hydrodynamic changes
		Emergence Regime Changes **(C)**	

6.4.3. ANNEX II DIADROMOUS MIGRATORY FISH

6.4.3.1. Natural England's Advice on Operations matrix lists a number of pressures for power cables (laying, burial and protection; operation and maintenance; decommissioning) and cables (HDD) in relation to designated sites (Natural England, 2020).

6.4.3.2. These pressures are given a risk level (low or Medium-High Risk) and are assessed against each interest feature of a designated site.

6.4.3.3. Those pressures for which Annex II diadromous fish species have been classed as 'sensitive', 'Insufficient Evidence' or 'N/A' have been included in the effects assessed for each of the SACs being considered as part of the LSE screening stage.

6.4.3.4. Given the broad spectrum of pressures itemised on the Advice on Operations matrix in relation to power cables and HDD they have then been categorised into effects which can then be assessed (Table 6.9). Where possible effects will reflect those identified in the Chapter 9 Fish and Shellfish of the ES (APP-124) for the Proposed Development.

6.4.3.5. It should be noted that not all the designated sites listed in Table 6.9 have an Advice on Operations matrix. Where this occurs a different designated site (proxy site) with the same Annex II diadromous fish species has been selected and using the same operations (power cable and HDD), the pressures and sensitivities have been recorded. Proxy sites used are defined in Table 6.9. In addition, where no proxy site is available for a specific species (e.g. salmon) the pressures for a comparable species (e.g. shad) have been used.

6.4.3.6. Although the potential effect of habitat loss is included in Table 6.9 it only relates to the loss of habitat from within a European site. Those SACs/Ramsars which list Annex II diadromous migratory fish are located outside the Proposed Development (the nearest site is 27.5 km away) and therefore there is no pathway for this effect to occur. As such, this effect will not be considered further in the determination of LSE.

6.4.3.7. Information on potential pressures associated with cabling activities was available from the Natural England Designated Sites View for Advice on Operations for Plymouth Sound and Estuaries SAC[16]

6.4.3.8. Designated sites where no Advice on Operations were available and a proxy site has been used are as follows:

- River Itchen SAC[17]

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16 https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0013111&SiteName=plymouth%20sound&SiteNameDisplay=Plymouth+Sound+and+Estuaries+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4 {Accessed: August 2020)

17 https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0013111&SiteName=plymouth%20sound&SiteNameDisplay=Plymouth+Sound+and+Estuaries+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4 {Accessed: August 2020)

- River Avon SAC[18,19]
- River Axe SAC[20]
- Baie de Canche et Couloir des trois Estuaires SAC[21,22]
- Baie de Seine Orientale SAC[23,24]
- Littoral Cauchois SAC[25,26]
- Estuaires et Littoral Picards (Baies de Somme et d'Authie) SAC/Baie de Somme Ramsar [27,28]

18 https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0013111&SiteName=plymouth%20sound&SiteNameDisplay=Plymouth+Sound+and+Estuaries+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4 {Accessed: August 2020)

19 https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0030170&SiteName=humber&SiteNameDisplay=Humber+Estuary+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=8 (Accessed: August 2020)

20 https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0030170&SiteName=humber&SiteNameDisplay=Humber+Estuary+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=8 (Accessed: August 2020)

21 https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0030170&SiteName=humber&SiteNameDisplay=Humber+Estuary+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=8 (Accessed: August 2020)

22 https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0013111&SiteName=plymouth%20sound&SiteNameDisplay=Plymouth+Sound+and+Estuaries+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4 {Accessed: August 2020)

23 https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0030170&SiteName=humber&SiteNameDisplay=Humber+Estuary+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=8 (Accessed: August 2020)

24 https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0013111&SiteName=plymouth%20sound&SiteNameDisplay=Plymouth+Sound+and+Estuaries+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4 {Accessed: August 2020)

25 https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0030170&SiteName=humber&SiteNameDisplay=Humber+Estuary+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=8 (Accessed: August 2020)

26 https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0013111&SiteName=plymouth%20sound&SiteNameDisplay=Plymouth+Sound+and+Estuaries+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4 {Accessed: August 2020)

27 https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0030170&SiteName=humber&SiteNameDisplay=Humber+Estuary+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=8 (Accessed: August 2020)

28 https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0013111&SiteName=ply

- Estuaires de la Seine SAC/Marais Vernier Ramsar[29,30]

mouth%20sound&SiteNameDisplay=Plymouth+Sound+and+Estuaries+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4 {Accessed: August 2020)

29 https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0013111&SiteName=plymouth%20sound&SiteNameDisplay=Plymouth+Sound+and+Estuaries+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4

30 https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0030170&SiteName=humber&SiteNameDisplay=Humber+Estuary+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=8

Table 6.9 - Predicted effects of the marine elements of the Proposed Development on relevant Annex II Migratory Fish Qualifying Features

Qualifying Feature	Site	Pressure	Effect
Salmon	River Itchen SAC* River Avon SAC* Baie de Canche et Couloir des trois Estuaires SAC* Baie de Seine Orientale SAC* Estuaires de la Seine SAC/Marais Vernier Ramsar*	Changes in suspended solids (water clarity) **(C, O, D)**	Increased SSC
		Deoxygenation **(O, D)** and barrier to species movement **(C)**	
		Collision below water with static or moving objects not naturally found in the marine environment **(C, O, D)**	Physical injury
		Habitat structure changes - removal of substratum (extraction) **(C, D)**	Habitat loss
		Introduction or spread of INIS **(C, O, D)**	Invasive species
		Hydrocarbon and PAH contamination **(C, O, D)**	Pollution events
		Litter **(C, O, D)**	
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals) **(C, O, D)**	
		Introduction of other substances (solid, liquid or gas) **(C)**	
		Transition elements & organo-metal (e.g. TBT) contamination **(C, O, D)**	
		Underwater noise changes **(C, O, D)**	Noise and vibration
		Vibration **(C, O, D)**	
		Visual Disturbance **(C, O, D)**	Visual disturbance
		Barrier to species movement **(O)**	EMF
		Electromagnetic changes **(O)**	
		Temperature decrease **(O)**	Temperature changes
		Temperature increase **(O)**	
Allis Shad	Plymouth Sound and Estuaries SAC Baie de Canche et Couloir des trois Estuaires SAC* Baie de Seine Orientale SAC*	Changes in suspended solids (water clarity) **(C, O, D)**	Increased SSC
		Deoxygenation **(O, D)** and barrier to species movement **(C)**	
		Collision below water with static or moving objects not naturally found in the marine environment **(C, O, D)**	Physical injury
		Habitat structure changes - removal of substratum (extraction) **(C, D)**	Habitat loss
		Introduction or spread of INIS **(C, O, D)**	Invasive species
		Hydrocarbon and PAH contamination **(C, O, D)**	Pollution events
		Litter **(C, O, D)**	
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals) **(C, O, D)**	
		Introduction of other substances (solid, liquid or gas) **(C)**	
		Transition elements & organo-metal (e.g. TBT) contamination **(C,O, D)**	
		Underwater noise changes **(C, O, D)**	Noise and vibration
		Vibration **(C, O, D)**	
		Visual Disturbance **(C, O, D)**	Visual disturbance
		Barrier to species movement **(O)**	EMF
		Electromagnetic changes **(O)**	
		Temperature decrease **(O)**	Temperature changes
		Temperature increase **(O)**	
Twaite Shad	Littoral Cauchois SAC*	Changes in suspended solids (water clarity) **(C, O, D)**	Increased SSC

Qualifying Feature	Site	Pressure	Effect
	Baie de Seine Orientale SAC* Estuaires de la Seine SAC/Marais Vernier Ramsar*	Deoxygenation **(C, O, D)** and barrier to species movement **(C)**	
		Collision below water with static or moving objects not naturally found in the marine environment **(C, O, D)**	Physical injury
		Habitat structure changes - removal of substratum (extraction) **(C, D)**	Habitat loss
		Introduction or spread of INIS **(C, O, D)**	Invasive species
		Hydrocarbon and PAH contamination **(C, O, D)**	Pollution events
		Litter **(C, O, D)**	
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals) **(C, O, D)**	
		Introduction of other substances (solid, liquid or gas) **(C)**	
		Transition elements & organo-metal (e.g. TBT) contamination **(C, O, D)**	
		Underwater noise changes **(C, O, D)**	Noise and vibration
		Vibration **(C, O, D)**	
		Visual Disturbance **(C, O, D)**	Visual disturbance
		Barrier to species movement **(O)**	EMF
		Electromagnetic changes **(O)**	
		Temperature decrease **(O)**	Temperature changes
		Temperature increase **(O)**	
Sea lamprey	River Avon SAC** River Axe SAC** Littoral Cauchois SAC** Estuaires et Littoral Picards (Baies de Somme et d'Authie) SAC Baie de Canche et Couloir des trois Estuaires SAC** Baie de Seine Orientale SAC** Estuaires de la Seine ZSC/Marais Vernier Ramsar **	Deoxygenation **(O, D)** and barrier to species movement **(C)**	Increased SSC
		Collision below water with static or moving objects not naturally found in the marine environment **(C, O, D)**	Physical injury
		Habitat structure changes - removal of substratum (extraction) **(C, D)**	Habitat loss
		Introduction or spread of INIS **(C, O, D)**	Invasive species
		Hydrocarbon & PAH contamination **(C, O, D)**	Pollution events
		Litter **(C, O, D)**	
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals **(C, O, D)**	
		Introduction of other substances (solid, liquid or gas) **(C)**	
		Transition elements & organo-metal (e.g. TBT) contamination **(C, O, D)**	
		Underwater noise changes **(C, O, D)**	Noise and vibration
		Vibration **(C, O, D)**	
		Barrier to species movement **(O)**	EMF
		Electromagnetic changes **(O)**	
		Temperature decrease **(O)**	Temperature changes
		Temperature increase **(O)**	
River Lamprey	Littoral Cauchois SAC** Estuaires et Littoral Picards (Baies de Somme et d'Authie) SAC** Baie de Canche et Couloir des trois Estuaires SAC**	Deoxygenation **(O, D)** and barrier to species movement **(C)**	Increased SSC
		Collision below water with static or moving objects not naturally found in the marine environment **(C, O, D)**	Physical injury
		Habitat structure changes - removal of substratum (extraction) **(C, D)**	Habitat loss
		Introduction or spread of INIS **(C, O, D)**	Invasive species

Qualifying Feature	Site	Pressure	Effect
	Baie de Seine Orientale SAC** Estuaires de la Seine SAC/Marais Vernier Ramsar**	Hydrocarbon & PAH contamination **(C, O, D)**	Pollution events
		Litter **(C, O, D)**	
		Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals **(C, O, D)**	
		Introduction of other substances (solid, liquid or gas) **(C)**	
		Transition elements & organo-metal (e.g. TBT) contamination **(C, O, D)**	
		Underwater noise changes **(C, O, D)**	Noise and vibration
		Vibration **(C, O, D)**	
		Barrier to species movement **(O)**	EMF
		Electromagnetic changes **(O)**	
		Temperature decrease **(O)**	Temperature changes
		Temperature increase **(O)**	

* - Plymouth sound and estuary SAC used as proxy due to unavailability of advice on operation information for site.

**- Humber estuary SAC used as proxy due to unavailability of advice on operation information for site.

C = construction phase, **O** = operation phase, **D** = decommissioning phase

6.4.4. MARINE MAMMALS

6.4.4.1. All the UK SACs for marine mammals were pre-screened out within Section 6.2.

6.4.4.2. For the French SACs/Ramsars, the 'documents d'objectifs'/site management plans were accessed (where they existed). However, equivalent activities/pressures information to that available for UK SACs was not presented within these documents. Therefore, the potential for LSE on the marine mammal features of the French SACs/Ramsars was assessed using the more detailed Advice on Operations information from UK SACs for the same marine mammal qualifying features.

6.4.4.3. Both low and medium-high risk pressures were considered. Pressures which were not assessed (NA) or for which there was insufficient evidence (IE) of feature sensitivity were also considered in addition to those pressures for which the evidence base suggests the feature is sensitive (S).

6.4.4.4. Pressures relating to the supporting habitats[31] of the marine mammal species (both UK and French sites) were not considered because the Proposed Development is too far for there to be any potential effect on the supporting habitats within the sites.

6.4.4.5. The pressures were grouped by effect type (see Table 6.10 below) and have been presented in the assessment of LSE (Section 7) and PINS matrices (Appendix 1, APP-501, Rev 002) as:

- Auditory injury;
- Disturbance;
- Collision;
- Indirect effects; and
- Pollution.

6.4.4.6. Although no pressures which may lead to either auditory injury or pollution were listed for either bottlenose dolphin (information taken from the Conservation Objectives and Advice on Operations document for the Cardigan Bay SAC) or grey seal (information taken from the Conservation Objectives and Advice on Operations document for the Pembrokeshire Marine SAC), the potential for LSE as a result of both auditory injury and pollution was assessed for sites where these species are features.

[31] The supporting habitats for marine mammals are considered to be coastal lagoons, intertidal coarse sediment, intertidal mixed sediments, intertidal mud, intertidal sand and muddy sand and water column as per the Advice on Operations for cables for The Wash and North Norfolk Coast SAC (https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0017075&SiteName=the+wash&SiteNameDisplay=The+Wash+and+North+Norfolk+Coast+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea) [accessed August 2020]. During consultation, Natural England requested that the supporting habitat 'water column' be considered for UK SACs.

Table 6.10 - Pressures listed for the different UK SACs and the corresponding effects which were assessed for all marine mammal sites. The pressures relate to all phases of the project (i.e. construction, operation and decommissioning) unless otherwise stated

Features	Site	Pressure	Effect
Bottlenose dolphin[32]	Estuaires et littoral picards (baies de Somme et d'Authie) SAC Littoral Cauchois SAC Baie de Seine orientale SAC	No pressures listed	Auditory injury
		Physical disturbance: displacement, visual, noise Potential electro-magnetic effects of electrical cables (operational phase only) Physical disturbance: collision, noise, visual	Disturbance
		Physical disturbance: collision, noise, visual	Collision
		Geophysical regime: addition of artificial substrate; local modification of water movement Geophysical regime: vessel wash - substrate erosion, local modification of wave exposure regime Scour effect on benthic habitats from cables due to wave action Fundamental environmental parameters: turbidity	Indirect effects
		No pressures listed	Pollution
Harbour porpoise[33]	Récifs Gris-Nez Blanc-Nez SAC Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC Baie de Canche et couloir des trois estuaires SAC Estuaires et littoral picards (baies de Somme et d'Authie) SAC Littoral Cauchois SAC Baie de Seine orientale SAC Estuaire de la Seine SAC	Anthropogenic underwater sound - mortality, internal injury, disturbance leading to physical and acoustic behavioural changes (potentially impacting foraging, navigation, breeding, socialising), habitat change/loss	Auditory injury
		Anthropogenic underwater sound - mortality, internal injury, disturbance leading to physical and acoustic behavioural changes (potentially impacting foraging, navigation, breeding, socialising), habitat change/loss	Disturbance
		Death or injury by collision - mortality, injury	Collision
		Anthropogenic underwater sound - mortality, internal injury, disturbance leading to physical and acoustic behavioural changes (potentially impacting foraging, navigation, breeding, socialising), habitat change/loss	Indirect effects
		Contaminants - effects on water and prey quality, bioaccumulation through contaminated prey ingestion, health issues (e.g. on reproduction)	Pollution

[32] Information on pressures for the relevant activities (considered to be Power/communication cables; Shipping: vessel traffic) taken from Table 3 of the Cardigan Bay SAC document (https://cdn.naturalresources.wales/media/687993/eng-cardigan-bay-reg-37-report-2018.pdf?mode=pad&rnd=131929023330000000).
[33] Information on pressures for the relevant activities (considered to be Discharge/run-off from landfill, terrestrial/offshore industries; Shipping; Dredging and disposal; Geophysical surveys) taken from Table 2 and Table A1 of the Southern North Sea SAC Conservation Advice and Advice on Operations document (http://jncc.defra.gov.uk/pdf/SNorthSea_ConsAdvice.pdf).

Features	Site	Pressure	Effect
Grey seal[34]	Récifs Gris-Nez Blanc-Nez SAC Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC Baie de Canche et couloir des trois estuaires SAC Estuaires et littoral picards (baies de Somme et d'Authie) SAC/Baie de Somme Ramsar Littoral Cauchois SAC Baie de Seine orientale SAC Estuaire de la Seine SAC	No pressures listed	Auditory injury
		Physical disturbance: displacement, visual, noise Potential electro-magnetic effects of electrical cables (operational phase only) Physical disturbance: collision, noise, visual	Disturbance
		Physical disturbance: collision, noise, visual	Collision
		Geophysical regime: addition of artificial substrate; local modification of water movement Geophysical regime: vessel wash - substrate erosion, local modification of wave exposure regime Fundamental environmental parameters: turbidity	Indirect effects
		No pressures listed	Pollution
Harbour seal[35]	Récifs Gris-Nez Blanc-Nez SAC Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC Baie de Canche et couloir des trois estuaires SAC Estuaires et littoral picards (baies de Somme et d'Authie) SAC/Baie de Somme Ramsar Littoral Cauchois SAC Baie de Seine orientale SAC Estuaire de la Seine SAC	Underwater noise changes Vibration	Auditory injury
		Above water noise Introduction of light Underwater noise changes Vibration Visual disturbance Barrier to species movement (operational phase only for power cables, construction phase only for HDD)	Disturbance
		Collision below water with static or moving objects not naturally found in the marine environment	Collision

[34] Information on pressures for the relevant activities (considered to be Power/communication cables; Shipping: vessel traffic (commercial)) taken from Table 3 of the Pembrokeshire Marine SAC document (https://cdn.naturalresources.wales/media/687999/eng-pembrokeshire-marine-reg-37-report-2018.pdf?mode=pad&rnd=131929024980000000).

[35] Information on pressures for the relevant activities (considered to be Cables – Power cable: Laying, burial and protection; Cables – Power cable: Operation and maintenance; Cables – Power cable: Decommissioning; Cables – Cables: HDD) taken from the Advice on Operations page of Natural England's Designated Sites View website for The Wash and North Norfolk Coast SAC (https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK0017075&SiteName=the%20wash&SiteNameDisplay=The+Wash+and+North+Norfolk+Coast+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=2) (accessed August 2020) .

Features	Site	Pressure	Effect
		Introduction or spread of INIS	Indirect effects
		Hydrocarbon and PAH contamination Litter Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals) Transition elements and organo-metal (e.g. TBT) contamination Introduction of other substances (solid, liquid or gas) (not listed for power cables, construction phase only for HDD)	Pollution

6.4.5. MARINE ORNITHOLOGY

6.4.5.1. Information on potential pressures associated with cabling activities was available from the Natural England Designated Sites View for Advice on Operations for the following European sites:

- Chichester and Langstone Harbours SPA[36];
- Portsmouth Harbour SPA[37];
- Solent and Southampton Water SPA[38]; and
- Pagham Harbour SPA[39].

6.4.5.2. Potential pressures identified for these European sites were applied to those features of European sites and Ramsars where Advice on Operations was not available. This approach was applied to:

- Solent and Dorset Coast SPA;
- Alderney West Coast and Burhou Islands Ramsar; and
- Littoral Seino-Marin ZPS/SPA.

6.4.5.3. Cabling activities considered included:

- Cables – Cables: HDD;
- Cables – Power cable: Laying, burial and protection;
- Cables – Power cable: Operation and maintenance; and
- Cables – Power cable: Decommissioning.

6.4.5.4. Both low and medium-high risk pressures were considered, including those pressures for which the evidence base suggests that a feature may be sensitive (S), as well as those pressures for which there was insufficient evidence (IE) or where the pressure was not assessed (NA) for feature sensitivity. For transboundary sites, feature sensitivity (interaction type) was not available.

[36] https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK9011011&SiteName=chichester&SiteNameDisplay=Chichester+and+Langstone+Harbours+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=18 (Accessed August 2020)
[37] https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK9011051&SiteName=portsmouth&SiteNameDisplay=Portsmouth+Harbour+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4 (Accessed August 2020)
[38] https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK9011061&SiteName=solent&SiteNameDisplay=Solent+and+Southampton+Water+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=9 (Accessed August 2020)
[39] https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK9012041&SiteName=pagham&SiteNameDisplay=Pagham+Harbour+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4 (Accessed August 2020)

6.4.5.5. Given the broad spectrum of pressures identified (see Table 6.11), pressures were grouped into those effects identified in the Chapter 11 Marine Ornithology of the ES (APP-126) for the Proposed Development.

Table 6.11 - Potential effects on marine ornithology features across all phases of the Proposed Development. The pressures relate to all phases of the project (i.e. construction, operation and decommissioning) unless otherwise stated.

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
Solent and Dorset Coast SPA	0.0 km	Above water noise	Disturbance and displacement	Sandwich tern Common tern Little tern	-
		Underwater noise changes		Sandwich tern Common tern Little tern Supporting habitat (water column)	-
		Visual disturbance		Sandwich tern Common tern Little tern Supporting habitat (water column)	-
		Introduction of light		Sandwich tern Common tern Little tern Supporting habitat (water column)	-
		Vibration		Supporting habitat (water column)	-
		Barrier to species movement (Operational phase and HDD in construction phase only)		Little tern Supporting habitat (water column)	-
		Collision above water with static or moving objects	Collision*	Sandwich tern Common tern Little tern	-
		Collision below water with static or moving objects		Sandwich tern Common tern Little tern	-
		Changes in suspended solids (water clarity)	Indirect effects	Sandwich tern Common tern Little tern Supporting habitat (water column)	-
		Deoxygenation		Supporting habitat (water column)	-
		Nutrient enrichment		Supporting habitat (water column)	-
		Habitat structure changes – removal of substratum		Supporting habitat (water column)	-

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
		(Construction and decommissioning phases only)			
		Physical loss (to land or freshwater) (Operational phase and cable lay/burial/protection period of construction phase only)		Supporting habitat (water column)	-
		Water flow (tidal current) changes, including sediment transport considerations		Sandwich tern Common tern Little tern Supporting habitat (water column)	-
		Emergence regime changes, including tidal level change considerations (HDD in construction phase only)		Sandwich tern Common tern Little tern Supporting habitat (water column)	-
		Transition elements and organometal contamination		Sandwich tern Common tern Little tern Supporting habitat (water column)	-
		Wave Exposure changes (HDD period of construction phase only)		Supporting habitat (water column)	
		Organic enrichment (HDD period of construction phase only)		Supporting habitat (water column)	
		Physical change (to another seabed type) (HDD in construction phase only)		Supporting habitat (water column)	
		Physical change (to another sediment type) (HDD in construction phase only)		Supporting habitat (water column)	
		Electromagnetic changes (Operational phase only)		Supporting habitat (water column)	
		Temperature decreases (Operational phase only)		Supporting habitat (water column)	
		Temperature increases (Operational phase only)		Supporting habitat (water column)	
		Hydrocarbon and Polycyclic Aromatic Hydrocarbon ('PAH') contaminants	Accidental spills	Sandwich tern Common tern Little tern	-

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
				Supporting habitat (water column)	
		Synthetic compound contamination (incl. pesticides, antifoulants and pharmaceuticals)		Sandwich tern Common tern Little tern Supporting habitat (water column)	-
		Introduction of other substance (solid, liquid, gas) (HDD in construction phase only)		Sandwich tern Common tern Little tern Supporting habitat (water column)	-
		Litter	Litter	Sandwich tern Common tern Little tern Supporting habitat (water column)	-
		Introduction or spread of INIS	INIS	Sandwich tern Common tern Little tern Supporting habitat (water column)	-
Chichester and Langstone Harbours SPA/Ramsar site	0.1 km	Visual disturbance	Disturbance and displacement	Red-breasted merganser Sandwich tern Common tern Little tern Supporting habitat (water column)	-
		Above water noise		Red-breasted merganser Sandwich tern Common tern Little tern	-
		Underwater noise changes		Sandwich tern Common tern Little tern Red-breasted merganser Supporting habitat (water column)	-
		Introduction of light		Sandwich tern Common tern Little tern Red-breasted merganser	-

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
				Supporting habitat (water column)	
		Vibration		Supporting habitat (water column)	-
		Barrier to species movement (Operational phase and HDD in construction phase only)		Little tern Red-breasted merganser Supporting habitat (water column)	
		Collision above water with static or moving objects	Collision*	Red-breasted merganser Sandwich tern Common tern Little tern	-
		Collision below water with static or moving objects		Red-breasted merganser Sandwich tern Common tern Little tern	-
		Changes in suspended solids (water clarity)	Indirect effects	Red-breasted merganser Sandwich tern Common tern Little tern Supporting habitat (water column)	-
		Deoxygenation		Supporting habitat (water column)	-
		Nutrient enrichment		Supporting habitat (water column)	-
		Habitat structure changes – removal of substratum (Construction and decommissioning phases only)		Supporting habitat (water column)	-
		Physical loss (to land or freshwater) (Operational phase and cable lay/burial/protection period of construction phase only)		Supporting habitat (water column)	-
		Water flow (tidal current) changes, including sediment transport considerations		Red-breasted merganser Sandwich tern Common tern Little tern Supporting habitat (water column)	-

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
		Emergence regime changes, including tidal level change considerations (HDD period of construction phase only)		Red-breasted merganser Sandwich tern Common tern Little tern Supporting habitat (water column)	-
		Transition elements and organometal contamination		Red-breasted merganser Sandwich tern Common tern Little tern Supporting habitat (water column)	-
		Wave Exposure changes (HDD period of construction phase only)		Red-breasted merganser Supporting habitat (water column)	
		Organic enrichment (HDD period of construction phase only)		Supporting habitat (water column)	
		Physical change (to another seabed type) (HDD period of construction phase only)		Supporting habitat (water column)	
		Physical change (to another sediment type) (HDD period of construction phase only)		Supporting habitat (water column)	
		Electromagnetic changes (Operational phase only)		Supporting habitat (water column)	
		Temperature decreases (Operational phase only)		Supporting habitat (water column)	
		Temperature increases (Operational phase only)		Supporting habitat (water column)	
		Hydrocarbon and PAH contaminants	Accidental spills	Red-breasted merganser Sandwich tern Common tern Little tern	-
		Synthetic compound contamination (incl. pesticides, antifoulants and pharmaceuticals)		Red-breasted merganser Sandwich tern Common tern Little tern Supporting habitat (water column)	
		Introduction of other substance (solid, liquid, gas) (HDD period of construction phase only)		Sandwich tern Common tern Little tern	

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
				Red-breasted merganser Supporting habitat (water column)	
		Litter	Litter	Red-breasted merganser Sandwich tern Common tern Little tern Supporting habitat (water column)	-
		Introduction or spread of INIS	INIS**	Sandwich tern Common tern Little tern Supporting habitat (water column)	-
Portsmouth Harbour SPA/Ramsar site	4.9 km	Visual disturbance	Disturbance and displacement	Red-breasted merganser Supporting habitat (water column)	-
		Above water noise		Red-breasted merganser	-
		Underwater noise changes		Red-breasted merganser Supporting habitat (water column)	-
		Introduction of light		Red-breasted merganser Supporting habitat (water column)	-
		Vibration		Supporting habitat (water column)	-
		Barrier to species movement (Operational phase and HDD period of construction phase only)		Red-breasted merganser Supporting habitat (water column)	
		Collision above water with static or moving objects	Collision*	Red-breasted merganser	-
		Collision below water with static or moving objects		Red-breasted merganser	-
		Changes in suspended solids (water clarity)	Indirect effects	Red-breasted merganser Supporting habitat (water column)	-
		Deoxygenation		Supporting habitat (water column)	-
		Nutrient enrichment		Supporting habitat (water column)	

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
		Habitat structure changes – removal of substratum (Construction and decommissioning phases only)		Supporting habitat (water column)	-
		Physical loss (to land or freshwater) (Operational phase and cable lay/burial/protection period of construction phase only)		Supporting habitat (water column)	-
		Water flow (tidal current) changes, including sediment transport considerations		Red-breasted merganser Supporting habitat (water column)	-
		Emergence regime changes, including tidal level change considerations (HDD period of construction phase only)		Red-breasted merganser Supporting habitat (water column)	-
		Transition elements and organometal contamination		Red-breasted merganser Supporting habitat (water column)	-
		Wave Exposure changes (HDD period of construction phase only)		Red-breasted merganser Supporting habitat (water column)	
		Organic enrichment (HDD period of construction phase only)		Supporting habitat (water column)	
		Physical change (to another seabed type) (HDD period of construction phase only)		Supporting habitat (water column)	
		Physical change (to another sediment type) (HDD period of construction phase only)		Supporting habitat (water column)	
		Electromagnetic changes (Operational phase only)		Supporting habitat (water column)	
		Temperature decreases (Operational phase only)		Supporting habitat (water column)	
		Temperature increases (Operational phase only)		Supporting habitat (water column)	
		Hydrocarbon and PAH contaminants	Accidental spills	Red-breasted merganser Supporting habitat (water column)	-
		Synthetic compound contamination (incl. pesticides,		Red-breasted merganser	

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
		antifoulants and pharmaceuticals)		Supporting habitat (water column)	
		Introduction of other substances (solid, liquid, gas)		Red-breasted merganser Supporting habitat (water column)	
		Litter	Litter	Red-breasted merganser Supporting habitat (water column)	-
		Introduction or spread of INIS	INIS**	Supporting habitat (water column)	-
Solent and Southampton Water SPA/Ramsar site	6.6 km	Above water noise	Disturbance and displacement	Sandwich tern Common tern Roseate tern Little tern Mediterranean gull	-
		Underwater noise changes		Sandwich tern Common tern Roseate tern Little tern Mediterranean gull Supporting habitat (water column)	-
		Visual disturbance		Sandwich tern Common tern Roseate tern Little tern Mediterranean gull Supporting habitat (water column)	-
		Introduction of light		Sandwich tern Common tern Roseate tern Little tern Mediterranean gull Supporting habitat (water column)	-
		Vibration		Supporting habitat (water column)	-
		Barrier to species movement (Operational phase and HDD period of construction phase only)		Little tern Supporting habitat (water column)	

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
		Collision above water with static or moving objects	Collision*	Sandwich tern Common tern Roseate tern Little tern Mediterranean gull	-
		Collision below water with static or moving objects		Sandwich tern Common tern Roseate tern Little tern Mediterranean gull	-
		Changes in suspended solids (water clarity)	Indirect effects	Sandwich tern Common tern Roseate tern Little tern Supporting habitat (water column)	-
		Deoxygenation		Supporting habitat (water column)	-
		Nutrient enrichment		Supporting habitat (water column)	-
		Habitat structure changes – removal of substratum (Construction and decommissioning phases only)		Supporting habitat (water column)	-
		Physical loss (to land or freshwater) (Operational phase and cable lay/burial/protection period of construction phase only)		Supporting habitat (water column)	-
		Water flow (tidal current) changes, including sediment transport considerations		Sandwich tern Common tern Roseate tern Little tern Mediterranean gull Supporting habitat (water column)	-
		Emergence regime changes, including tidal level change considerations (HDD period of construction phase only)		Sandwich tern Common tern Roseate tern Little tern Mediterranean gull Supporting habitat (water column)	

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
		Transition elements and organometal contamination		Sandwich tern Common tern Roseate tern Little tern Mediterranean gull Supporting habitat (water column)	-
		Wave Exposure changes (HDD period of construction phase only)		Supporting habitat (water column)	
		Organic enrichment (HDD period of construction phase only)		Supporting habitat (water column)	
		Physical change (to another seabed type) (HDD period of construction phase only)		Supporting habitat (water column)	
		Physical change (to another sediment type) (HDD period of construction phase only)		Supporting habitat (water column)	
		Electromagnetic changes (Operational phase only)		Supporting habitat (water column)	
		Temperature decreases (Operational phase only)		Supporting habitat (water column)	
		Temperature increases (Operational phase only)		Supporting habitat (water column)	
		Hydrocarbon and PAH contaminants	Accidental spills	Sandwich tern Common tern Roseate tern Little tern Mediterranean gull Supporting habitat (water column)	-
		Synthetic compound contamination (incl. pesticides, antifoulants and pharmaceuticals)		Sandwich tern Common tern Roseate tern Little tern Mediterranean gull Supporting habitat (water column)	-
		Introduction of other substance (solid, liquid, gas) (HDD period of construction phase only)		Sandwich tern Common tern Roseate tern Little tern	

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
				Mediterranean gull Supporting habitat (water column)	
		Litter	Litter	Sandwich tern Common tern Roseate tern Little tern Mediterranean gull Supporting habitat (water column)	-
		Introduction or spread of INIS	INIS	Sandwich tern Common tern Roseate tern Little tern Mediterranean gull Supporting habitat (water column)	-
Pagham Harbour SPA/Ramsar site	9.5 km	Above water noise	Disturbance and displacement	Common tern	-
		Underwater noise		Common tern Supporting habitat (water column)	-
		Visual disturbance		Common tern Supporting habitat (water column)	-
		Introduction of light		Common tern Supporting habitat (water column)	-
		Vibration		Supporting habitat (water column)	-
		Barrier to species movement (Operational phase and HDD period of construction phase only)		Supporting habitat (water column)	
		Collision above water with static or moving objects	Collision*	Common tern	-
		Collision below water with static or moving objects		Common tern	-
		Changes in suspended solids (water clarity)	Indirect effects	Common tern Supporting habitat (water column)	-
		Deoxygenation		Supporting habitat (water column)	-

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
		Nutrient enrichment		Supporting habitat (water column)	-
		Habitat structure changes – removal of substratum (Construction and decommissioning phases only)		Supporting habitat (water column)	-
		Physical loss (to land or freshwater) (Operational phase and cable lay/burial/protection period of construction phase only)		Supporting habitat (water column)	-
		Water flow (tidal current) changes, including sediment transport considerations		Common tern Supporting habitat (water column)	-
		Emergence regime changes, including tidal level change considerations (HDD period of construction phase only)		Common tern Supporting habitat (water column)	
		Transition elements and organometal contamination		Common tern Supporting habitat (water column)	-
		Wave Exposure changes (HDD period of construction phase only)		Supporting habitat (water column)	
		Organic enrichment (HDD period of construction phase only)		Supporting habitat (water column)	
		Physical change (to another seabed type) (HDD period of construction phase only)		Supporting habitat (water column)	
		Physical change (to another sediment type) (HDD period of construction phase only)		Supporting habitat (water column)	
		Electromagnetic changes (Operational phase only)		Supporting habitat (water column)	
		Temperature decreases (Operational phase only)		Supporting habitat (water column)	
		Temperature increases (Operational phase only)		Supporting habitat (water column)	
		Hydrocarbon and PAH contaminants	Accidental spills	Common tern Supporting habitat (water column)	-

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
		Synthetic compound contamination (incl. pesticides, antifoulants and pharmaceuticals)		Common tern Supporting habitat (water column)	-
		Introduction of other substance (solid, liquid, gas) (HDD period of construction phase only)		Common tern Supporting habitat (water column)	
		Litter	Litter	Common tern Supporting habitat (water column)	-
		Introduction or spread of INIS	INIS	Common tern Supporting habitat (water column)	-
Littoral Seino-Marin SPA	30.6 km	Above water noise	Disturbance and displacement	-	Fulmar Great black-backed gull Herring gull Kittiwake
		Visual disturbance		-	Fulmar Great black-backed gull Herring gull Kittiwake Supporting habitat (water column)
		Underwater noise changes		-	Fulmar Great black-backed gull Herring gull Kittiwake Supporting habitat (water column)
		Introduction of light		-	Fulmar Great black-backed gull Herring gull Kittiwake Supporting habitat (water column)
		Vibration			Supporting habitat (water column)
		Barrier to species movement (Operational phase and HDD period of construction phase only)			Fulmar Great black-backed gull Herring gull Kittiwake Supporting habitat (water column)

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
		Collision above water with static or moving objects	Collision	-	Fulmar Great black-backed gull Herring gull Kittiwake
		Collision below water with static or moving objects		-	Fulmar Great black-backed gull Herring gull Kittiwake
		Changes in suspended solids (water clarity)	Indirect effects	-	Fulmar Great black-backed gull Herring gull Kittiwake Supporting habitat (water column)
		Deoxygenation			Supporting habitat (water column)
		Nutrient enrichment			Supporting habitat (water column)
		Habitat structure changes – removal of substratum (Construction and decommissioning phases only)			Supporting habitat (water column)
		Physical loss (to land or freshwater) (Operational phase and cable lay/burial/protection period of construction phase only)			Supporting habitat (water column)
		Water flow (tidal current) changes, including sediment transport considerations		-	Fulmar Great black-backed gull Herring gull Kittiwake Supporting habitat (water column)
		Emergence regime changes, including tidal level change considerations (HDD period of construction phase only)		-	Fulmar Great black-backed gull Herring gull Kittiwake Supporting habitat (water column)
		Transition elements and organometal contamination		-	Fulmar Great black-backed gull Herring gull Kittiwake

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
					Supporting habitat (water column)
		Wave Exposure changes (HDD period of construction phase only)			Supporting habitat (water column)
		Organic enrichment (HDD period of construction phase only)			Supporting habitat (water column)
		Physical change (to another seabed type) (HDD period of construction phase only)			Supporting habitat (water column)
		Physical change (to another sediment type) (HDD period of construction phase only)			Supporting habitat (water column)
		Electromagnetic changes (Operational phase only)			Supporting habitat (water column)
		Temperature decreases (Operational phase only)			Supporting habitat (water column)
		Temperature increases (Operational phase only)			Supporting habitat (water column)
		Hydrocarbon and PAH contaminants	Accidental spills	-	Fulmar Great black-backed gull Herring gull Kittiwake Supporting habitat (water column)
		Synthetic compound contamination (incl. pesticides, antifoulants and pharmaceuticals)		-	Fulmar Great black-backed gull Herring gull Kittiwake Supporting habitat (water column)
		Introduction of other substance (solid, liquid, gas) (HDD period of construction phase only)			Supporting habitat (water column)
		Litter	Litter	-	Fulmar Great black-backed gull Herring gull Kittiwake Supporting habitat (water column)

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
		Introduction or spread of INIS	INIS	-	Fulmar Great black-backed gull Herring gull Kittiwake Supporting habitat (water column)
Alderney West Coast and Burhou Islands Ramsar	142.0 km	Above water noise	Disturbance and displacement	-	Gannet Storm petrel Lesser black-backed gull
		Visual disturbance		-	Gannet Storm petrel Lesser black-backed gull Supporting habitat (water column)
		Underwater noise changes		-	Gannet Storm petrel Lesser black-backed gull Supporting habitat (water column)
		Introduction of light		-	Gannet Storm petrel Lesser black-backed gull Supporting habitat (water column)
		Vibration			Supporting habitat (water column)
		Barrier to species movement (Operational phase and HDD period of construction phase only)			Gannet Storm petrel Lesser black-backed gull Supporting habitat (water column)
		Collision above water with static or moving objects	Collision	-	Gannet Storm petrel Lesser black-backed gull
		Collision below water with static or moving objects		-	Gannet Storm petrel Lesser black-backed gull
		Changes in suspended solids (water clarity)	Indirect effects	-	Gannet Storm petrel Lesser black-backed gull Supporting habitat (water column)

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
		Deoxygenation			Supporting habitat (water column)
		Nutrient enrichment			Supporting habitat (water column)
		Habitat structure changes – removal of substratum (Construction and decommissioning phases only)			Supporting habitat (water column)
		Physical loss (to land or freshwater) (Operational phase and cable lay/burial/protection period of construction phase only)			Supporting habitat (water column)
		Water flow (tidal current) changes, including sediment transport considerations		-	Gannet Storm petrel Lesser black-backed gull Supporting habitat (water column)
		Emergence regime changes, including tidal level change considerations (HDD period of construction phase only)		-	Gannet Storm petrel Lesser black-backed gull Supporting habitat (water column)
		Transition elements and organometal contamination		-	Gannet Storm petrel Lesser black-backed gull Supporting habitat (water column)
		Wave Exposure changes (HDD period of construction phase only)			Supporting habitat (water column)
		Organic enrichment (HDD period of construction phase only)			Supporting habitat (water column)
		Physical change (to another seabed type) (HDD period of construction phase only)			Supporting habitat (water column)
		Physical change (to another sediment type) (HDD period of construction phase only)			Supporting habitat (water column)
		Electromagnetic changes (Operational phase only)			Supporting habitat (water column)

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
		Temperature decreases (Operational phase only)			Supporting habitat (water column)
		Temperature increases (Operational phase only)			Supporting habitat (water column)
		Hydrocarbon and PAH contaminants	Accidental spills	-	Gannet Storm petrel Lesser black-backed gull Supporting habitat (water column)
		Synthetic compound contamination (incl. pesticides, antifoulants, Pharmaceuticals)		-	Gannet Storm petrel Lesser black-backed gull Supporting habitat (water column)
		Introduction of other substance (solid, liquid, gas) (HDD period of construction phase only)			Supporting habitat (water column)
		Litter	Litter	-	Gannet Storm petrel Lesser black-backed gull Supporting habitat (water column)
		Introduction or spread of INIS	INIS	-	Gannet Storm petrel Lesser black-backed gull Supporting habitat (water column)

Key: * Collision not identified as a pressure-effect interaction for supporting habitat (water column) in Natural England Advice on Operations; ** INIS not identified as a pressure-effect interaction for red-breasted merganser in Natural England Advice on Operations.

6.5. POTENTIAL EFFECTS – ONSHORE ENVIRONMENT

6.5.1.1. A number of environmental impacts have been identified and assessed in Chapter 16 of the ES (Onshore Ecology) for the Proposed Development. These have been reviewed alongside information on potential pressures and threats on features of relevant designated sites in order to determine a list of potential effects for the purposes of HRA. Details on potential pressures and threats are available from Natural England Designated Sites View for Advice on Operations for the following European sites:

- Chichester and Langstone Harbours SPA/Ramsar[40,41]; and
- Portsmouth Harbour SPA/Ramsar[42,43];

6.5.1.2. Potential pressures identified for these European sites were applied to those features of European sites where Advice on Operations was not available. This approach was applied to the black-tailed godwit feature of Chichester and Langstone Harbours Ramsar site.

6.5.1.3. In line with the listed pressures with respect to the marine environment, pressures are grouped into those effects identified in Chapter 16 (Onshore Ecology) of the ES for the Proposed Development, (as summarised inTable 6.12 below).

6.5.1.4. Table 6.12 considers both low and medium-high risk pressures, including those pressures for which the evidence base suggests that a feature may be sensitive (S), as well as those pressures for which there was insufficient evidence (IE) or where the pressure was not assessed (NA) for feature sensitivity.

6.5.1.5. There are considered to be limited pathways for impacts on supporting habitats of relevant European sites to occur as a result of any activity from onshore elements of the Proposed Development. Table 6.12 identifies supporting habitats for relevant sites where low and medium-high risk pressures are noted within Natural England's Designated Sites View for Advice on Operations. Supporting habitats within Table 6.12 are not identified individually.

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[40] https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK9011011&SiteName=chichester&SiteNameDisplay=Chichester+and+Langstone+Harbours+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=18 (Accessed August 2020)
[41] https://rsis.ramsar.org/ris/378 (Accessed August 2020)
[42] https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK9011051&SiteName=portsmouth&SiteNameDisplay=Portsmouth+Harbour+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4 (Accessed August 2020)
[43] https://rsis.ramsar.org/ris/720 (Accessed August 2020)

Table 6.12 - Potential effects on onshore ecology across all phases of the Proposed Development

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
Chichester and Langstone Harbours SPA/Ramsar site	0.1 km	Visual disturbance	Disturbance and displacement	Sandwich tern Little tern Common tern Pintail Shoveler Teal Wigeon Turnstone Dark-bellied brent goose Sanderling Dunlin Grey plover Ringed Plover Bar-tailed godwit Black-tailed godwit Curlew Shelduck Redshank Waterfowl assemblage	-
		Above water noise		Sandwich tern Little tern Common tern Pintail Shoveler Teal Wigeon Turnstone Dark-bellied brent goose Sanderling Dunlin Grey plover Ringed Plover Bar-tailed godwit Black-tailed godwit Curlew Shelduck Redshank Waterfowl assemblage	-
		Introduction of light		Sandwich tern Little tern Common tern Pintail Shoveler	-

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
				Teal Wigeon Turnstone Dark-bellied brent goose Sanderling Dunlin Grey plover Ringed Plover Bar-tailed godwit Black-tailed godwit Curlew Shelduck Redshank Waterfowl assemblage	
		Vibration (construction phase only)		Supporting habitat (freshwater and coastal grazing marsh)	-
		Physical loss (to land or freshwater (construction phase only)	Indirect effects	Supporting habitat (freshwater and coastal grazing marsh)	-
		Transition elements and organometal contamination		Sandwich tern Little tern Common tern Pintail Shoveler Teal Wigeon Turnstone Dark-bellied brent goose Sanderling Dunlin Grey plover Ringed Plover Bar-tailed godwit Black-tailed godwit Curlew Shelduck Redshank Watefowl assemblage Supporting habitat (freshwater and coastal grazing marsh)	-
		Hydrocarbon and PAH contaminants	Accidental spills	Sandwich tern Little tern Common tern	-

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
				Pintail Shoveler Teal Wigeon Turnstone Dark-bellied brent goose Sanderling Dunlin Grey plover Ringed Plover Bar-tailed godwit Black-tailed godwit Curlew Shelduck Redshank Waterfowl assemblage Supporting habitat (freshwater and coastal grazing marsh)	
		Synthetic compound contamination (incl. pesticides, antifoulants and pharmaceuticals)		Sandwich tern Little tern Common tern Pintail Shoveler Teal Wigeon Turnstone Dark-bellied brent goose Sanderling Dunlin Grey plover Ringed Plover Bar-tailed godwit Black-tailed godwit Curlew Shelduck Redshank Waterfowl assemblage Supporting habitat (freshwater and coastal grazing marsh)	
		Litter	Litter	Sandwich tern Little tern Common tern Pintail Shoveler	-

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
				Teal Wigeon Turnstone Dark-bellied brent goose Sanderling Dunlin Grey plover Ringed Plover Bar-tailed godwit Black-tailed godwit Curlew Shelduck Redshank Waterfowl assemblage Supporting habitat (freshwater and coastal grazing marsh)	
		Introduction or spread of INIS	INIS**	Sandwich tern Little tern Common tern Pintail Wigeon Turnstone Dark-bellied brent goose Dunlin Grey plover Shelduck Redshank Waterfowl assemblage Supporting habitat (freshwater and coastal grazing marsh)	-
Portsmouth Harbour SPA/Ramsar site	4.9 km	Visual disturbance	Disturbance and displacement	Dark-bellied brent goose Dunlin Black-tailed godwit	-
		Above water noise		Dark-bellied brent goose Dunlin Black-tailed godwit	-
		Introduction of light		Dark-bellied brent goose Dunlin Black-tailed godwit	-
		Vibration		Supporting habitat (freshwater and coastal grazing marsh)	

Relevant SPA/Ramsar site	Indicative distance from SPA/Ramsar to Proposed Development	Pressure	Effect	Features	Transboundary site interaction
		Physical loss (to land or freshwater)	Indirect effects	Supporting habitat (freshwater and coastal grazing marsh)	-
		Transition elements and organometal contamination		Supporting habitat (freshwater and coastal grazing marsh)	-
		Hydrocarbon and PAH contaminants	Accidental spills	Dark-bellied brent goose Dunlin Black-tailed godwit Supporting habitat (freshwater and coastal grazing marsh)	-
		Synthetic compound contamination (incl. pesticides, antifoulants and pharmaceuticals)		Dark-bellied brent goose Dunlin Black-tailed godwit Supporting habitat (freshwater and coastal grazing marsh)	
		Litter	Litter	Dark-bellied brent goose Dunlin Black-tailed godwit Supporting habitat (freshwater and coastal grazing marsh)	-
		Introduction or spread of INIS	INIS**	Dark-bellied brent goose Dunlin Black-tailed godwit Supporting habitat (freshwater and coastal grazing marsh)	-

7. DETERMINATION OF LIKELY SIGNIFICANT EFFECTS

7.1. OVERVIEW

7.1.1.1. Following the initial pre-screening stage, more detailed information can be used to assess the LSE on the sites and features screened in for further assessment in Section 6.

7.1.1.2. Assessments are undertaken using the screening matrices presented in Appendix 1 and Appendix 5 (APP-501, Rev 002 and 7.7.10) which assess the European Marine Sites (i.e. SACs and SPAs) and Ramsars respectively. The matrices present assessment of likely effects on site features from the Proposed Development alone and in combination with other projects (see Section 8).

7.1.1.3. The following assessments utilise information presented in Section 4 and Section 5 of this document and the ES to determine whether no LSE can be concluded on the European sites and features.

7.1.1.4. Where it was not possible to determine no LSE on a designated site, they have been considered further as part of the AA (Section 10).

7.2. ASSESSMENT OF LSE – MARINE ENVIRONMENT

7.2.1. ANNEX I HABITATS

7.2.1.1. An assessment of LSE on designated marine Annex I habitat features during the construction, operation and decommissioning phases of the Proposed Development is provided in Table 7.1.

Table 7.1 - Assessment of LSE on designated Annex I features as a result of the Proposed Development across all phases of development

SAC	Effect	Feature	LSE?	Justification
Solent Maritime	Habitat disturbance	Estuaries [1130]	N	Only habitats located within the Marine Cable Corridor will be affected by habitat disturbance as a result of direct impacts from construction activities. The Marine Cable Corridor overlaps the Solent Maritime SAC, covering approximately 163.4 m^2 near the Landfall between KP0 and KP0.76. However, the project design only proposes the use of HDD Landfall methodology, with the HDD exit/entry point located between KP1.0 and KP1.6 (approx. 0.24 km from the boundary of the SAC). Therefore, there is no pathway for the Proposed Development to result in habitat disturbance to the SAC. Therefore, there is no potential for habitat disturbance to Annex I habitats, and no potential for LSE.
		Sandbanks which are slightly covered by sea water all the time [1110]	N	
		Mudflats and sandflats not covered by seawater at low tide [1140]	N	
		Spartina swards [1320]	N	
		Atlantic salt meadows [1330]	N	
		Salicornia and other annuals colonising mud and sand [1310]	N	
	Increased SSC	Estuaries [1130]	Y	During dredge disposal, peak SSC of 1000 mgl^{-1} could arise within 1 km from the release point but coarser sediment expected to fall out of suspension quickly (almost immediately) with significant reductions of SSC within hours of disposal at each location. Beyond 1 km from release, the passive plume which is transported beyond this is likely to generate SSC in the region of approximately 20 mgl^{-1}, transported in the direction of the prevailing flow out to a distance of *c.* 25km. SSC is predicted to reduce to <1 – 6 mgl^{-1} within the timeframe of a few days following completion of disposal activities. Other cable installation activities (including for repair and maintenance) also have the potential to raise SSC in the vicinity of the work. It is predicted that peak SSCs of up to 200 mgl^{-1} may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl^{-1} are predicted. SSC is expected to return to background levels within a few days following completion of these activities. The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl^{-1}) and therefore not discernible above natural variation. Due to the close proximity of the Solent Maritime SAC (including Langstone harbour, the mouth of which is located less than 1 km from the Marine Cable Corridor), and the resulting potential for increased levels of SSC to be present within the SAC, it is considered that LSE cannot be ruled out for any feature (at any project phase) which has connectivity to the work.
		Sandbanks which are slightly covered by sea water all the time [1110]	Y	
		Mudflats and sandflats not covered by seawater at low tide [1140]	Y	
		Spartina swards [1320]	Y	
		Atlantic salt meadows [1330]	Y	
		Salicornia and other annuals colonising mud and sand [1310]	Y	
	Deposition of sediment (smothering)	Estuaries [1130]	Y	Sediment deposition from disposal activities will be local to the point of release (i.e. within 1000 m), with deposits of coarser sediments potentially observed to depths of between 10 mm and 1.5 m, with greatest deposition observed across an area of a few hundred metres, elongated in the direction of the prevailing flow at the time of release, relative to the release site. Finer sediments will be redistributed and any deposition outside the Marine Cable Corridor will be
		Sandbanks which are slightly covered by sea water all the time [1110]	Y	
		Mudflats and sandflats not covered by seawater at low tide [1140]	Y	

SAC	Effect	Feature	LSE?	Justification
		Spartina swards [1320]	Y	transient and negligible, with any settled material being quickly redistributed under the forcing of tidal flows. Other cable installation activities (including for repair and maintenance) also have the potential to result in sediment deposition. Due to the close proximity of the Solent Maritime SAC (including Langstone harbour, the mouth of which is located less than a kilometre from the Marine Cable Corridor), and the resulting potential for deposition within the SAC, it is considered that LSE (at any project phase) cannot be ruled out.
		Atlantic salt meadows [1330]	Y	
		Salicornia and other annuals colonising mud and sand [1310]	Y	
	Habitat loss	Estuaries [1130]	N	Due to the use of HDD at cable Landfall, marine activities that can result in a loss of habitat will be undertaken only in the Marine Cable Corridor beyond the HDD entry/exit point which will be located between KP1.0 to KP1.6, outside the overlap area with the Solent Maritime SAC (boundary of SAC at approx. KP0.76). This includes excavation of seabed sediments at the HDD exit/entry point. Habitat loss as a result of sediment deposition has been considered. It is determined that any deposition will not result in potential for habitat loss via change to another sediment type or seabed type as any deposition that does occur will be of similar sediment types and would not be of a level to cause a change in seabed type or profile (see assessment of LSE for sediment deposition for details of predicted levels). Therefore, there is no potential for Annex I habitat loss within the Solent Maritime SAC, and no potential for LSE.
		Sandbanks which are slightly covered by sea water all the time [1110]	N	
		Mudflats and sandflats not covered by seawater at low tide [1140]	N	
		Spartina swards [1320]	N	
		Atlantic salt meadows [1330]	N	
		Salicornia and other annuals colonising mud and sand [1310]	N	
	Pollution	Estuaries [1130]	Y	Marine litter is any manufactured or processed solid material from anthropogenic activities discarded, disposed or abandoned (excluding legitimate disposal) once it enters the marine and coastal environment including plastics, metals, timber, rope, fishing gear etc. and their degraded components, e.g. microplastic particles (Natural England, 2019). Ecological effects can be physical (smothering), biological (ingestion, including uptake of microplastics; entangling; physical damage; accumulation of chemicals) and/or chemical (leaching, contamination). Marine litter can be released into the marine environment by shipping vessels either accidentally (inappropriate storage) or deliberately (Potts and Hasting, 2011; Lozano and Mouat, 2009). Shipping related litter contributes approximately 2% of the litter found on UK beaches. Deliberate discharges of oil or oil/water mixtures and synthetic compounds from ships are prohibited in all waters around the UK and its approaches. However, accidental discharges still occur. Drilling fluid, usually consisting of water and clay material (bentonite) will be used as a lubricant. Whilst methods can be employed to minimise the risk, leakage or outbreaks of these materials into the environment can occur.
		Sandbanks which are slightly covered by sea water all the time [1110]	Y	
		Mudflats and sandflats not covered by seawater at low tide [1140]	Y	
		Spartina swards [1320]	Y	
		Atlantic salt meadows [1330]	Y	
		Salicornia and other annuals colonising mud and sand [1310]	Y	

SAC	Effect	Feature	LSE?	Justification
				It is therefore considered that the potential for LSE as a result of pollution (including litter) cannot be ruled out.
	Resuspension of contaminated sediments	Estuaries [1130]	N	Results from the subtidal contaminated sediment survey (Chapter 7 Marine Water and Sediment Quality), indicate that the sediments within the Marine Cable Corridor do not contain significantly elevated levels of contaminants with no records of any contaminant exceeding Cefas Action Level 2. In addition, for all contaminants other than Arsenic, no exceedance of Action Level 1 was recorded. Arsenic did exceed Action Level 1 at two locations (although only at one of these was it above the Oslo and Paris Conventions ('OSPAR') Background Assessment Concentration) however these appear isolated areas and with no indication of a pattern or common source. Evidence from the nearby IFA2 interconnector and Rampion OWF projects also suggests that the wider area is not heavily contaminated. The lack of contamination in the nearshore sediments within the Marine Cable Corridor indicates that there is a very low risk of sediment borne contaminants being re-released into the water column. As such, it is therefore concluded that there is no potential for LSE to arise from this effect.
		Sandbanks which are slightly covered by sea water all the time [1110]	N	
		Mudflats and sandflats not covered by seawater at low tide [1140]	N	
		Spartina swards [1320]	N	
		Atlantic salt meadows [1330]	N	
		Salicornia and other annuals colonising mud and sand [1310]	N	
	Invasive species	Estuaries [1130]	Y	The introduction and INIS can occur directly through the release of individuals of INIS species into the environment via activities, e.g. through release of ballast water (Ware, 2009), on the hull of ships even if recently cleaned or anti-fouled (International Maritime Organisation (IMO), 2012; Davidson *et al*., 2010), or indirectly by creating opportunities for organisms to settle or spread (e.g. habitat creation or disturbance), thereby allowing for them to out-compete native species. The Proposed Development will increase local traffic, disturb the seabed and introduce new hard substrate (in the form of cable protection), which has the potential to influence the introduction and spread of INIS. However, this area is a busy shipping channel and already possesses significant hard substrate modifications for navigation, ports and flood protection measures. There are several INIS species known to be present in the Marine Cable Corridor, such as the slipper limpet (*Crepidula fornicate)*, Pacific oyster (*Crassostrea (Magallana) gigas*), Chinese mitten crabs (*Eriocheir sinensis*), wire weed (*Sargassum muticum*), and the leathery sea squirt (*styela clava*) (Eno *et al*., 1997; GB Non-Native Species Secretariat, 2019). It is therefore considered that the potential for LSE as a result of INIS cannot be ruled out.
		Sandbanks which are slightly covered by sea water all the time [1110]	Y	
		Mudflats and sandflats not covered by seawater at low tide [1140]	Y	
		Spartina swards [1320]	Y	
		Atlantic salt meadows [1330]	Y	
		Salicornia and other annuals colonising mud and sand [1310]	Y	
	EMF	Estuaries [1130]	N	EMF effects will not extend outwith the Marine Cable Corridor and as such no effects on this feature are likely. Therefore, there is no potential for LSE.
		Sandbanks which are slightly covered by sea water all the time [1110]	N	This feature may be present directly over the operating cable. Due to the use of HDD, the target burial depth under the SAC is 5 m. At this depth, the predicted EMF will be 2 µT (50 µT including Geostatic field) (Chapter 3 Description of the Proposed Development, APP-118). This is broadly equivalent to the background geostatic field.

SAC	Effect	Feature	LSE?	Justification
				The majority of the research relating to the environmental effects of EMF is migratory behaviour in birds and fish, also electro-sensitive marine species such as elasmobranchs (Gill and Bartlett, 2010). Although some invertebrate species are thought to be electro or magneto-sensitive, there is no evidence to indicate that EMF has any detrimental effects on benthic organisms. Therefore, due to the negligible change in EMF compared to background levels it is concluded there is no potential for LSE.
		Mudflats and sandflats not covered by seawater at low tide [1140]	N	This feature may be present directly over the operating cable. Due to the use of HDD, the target burial depth under the SAC is 5 m. At this depth, the predicted EMF will be 2 µT (50 µT including Geostatic field) (Chapter 3 (Description of the Proposed Development) of the Environment Statement). This is broadly equivalent to the background geostatic field. The majority of the research relating to the environmental effects of EMF is migratory behaviour in birds and fish, also electro-sensitive marine species such as elasmobranchs (Gill and Bartlett, 2010). Although some invertebrate species are thought to be electro or magneto-sensitive, there is no evidence to indicate that EMF has any detrimental effects on benthic organisms. Therefore, due to the negligible change in EMF compared to background levels, it is concluded there is no potential for LSE.
		Spartina swards [1320]	N	EMF effects will not extend outwith the Marine Cable Corridor and as such no effects on this feature are likely. Therefore, there is no potential for LSE.
		Atlantic salt meadows [1330]	N	EMF effects will not extend outwith the Marine Cable Corridor and as such no effects on this feature are likely. Therefore, there is no potential for LSE.
		Salicornia and other annuals colonising mud and sand [1310]	N	EMF effects will not extend outwith the Marine Cable Corridor and as such no effects on this feature are likely. Therefore, there is no potential for LSE.
	Increased light Pollution	Estuaries [1130]	N	Increased pressure may potentially result from navigation and operational lighting on vessels during construction repair and maintenance activities. Lighting is required to enable safe working conditions on site, therefore only habitats within, or in very close proximity (tens of metres) to the Marine Cable Corridor are considered to have the potential to be affected during construction activities. Lighting can cause disorientation or displace sensitive species (Natural England, 2019). Benthic organisms have some sensitivity to light (Tillin, 2016a; Tillin, 2016d), however the majority of effects relating to this potential impact are only relevant to birds, where night operations are planned in SPAs which have sensitive species that could be present and at sensitive times of the year (OSPAR, 2008; Shell Offshore Inc., 2011; Hill, 1992; Dwyer *et al*., 2013; European Commission, 2009; Royal Haskoning, 2011; Montevecchi, 2006). Due to the use of HDD below the intertidal area, marine activities which require lighting will be undertaken only in the Marine Cable Corridor at or beyond the HDD entry/exit point, which will be located between KP1.0 to KP1.6. This is outside the overlap area with the Solent Maritime SAC (boundary of which lies at approx. KP0.76). Therefore, there is no potential for LSE.
		Sandbanks which are slightly covered by sea water all the time [1110]	N	
		Mudflats and sandflats not covered by seawater at low tide [1140]	N	

SAC	Effect	Feature	LSE?	Justification
	Temperature changes	Estuaries [1130]	N	Temperature effects will not extend outwith the Marine Cable Corridor and as such no effects on this feature are likely. Therefore, there is no potential for LSE.
		Sandbanks which are slightly covered by sea water all the time [1110]	N	Operation of the cables will result in heat being emitted from the cable and subsequent warming of the surrounding environment. Heat losses reduce the efficiency of the cable and as a result, the cables have been designed to minimise thermal loss. Heating effects will be localised to the proximity of the cable and quickly dissipate (Aecom Intertek, 2011; Nemo Link, 2013). Thermal emission and its effects will depend on the type of cables, transmission rate and the receiving environment (OSPAR Commission, 2012). Thermal resistance for the soil surrounding a buried cable usually increases with increasing the burial depth. A study undertaken to inform the Nemo Link Interconnector project (Nemo Link, 2013) calculated that localised temperature increases in the seabed above the bundled cables buried to a depth of 2.5 m would be 1.2°C at 30 cm depth above the cable (i.e. at a distance of 2.2 m directly above the cable, 30 cm below the seabed surface) and 0.7°C at 10 cm. A conservative calculation of temperature increases for bundled cables conducted for Viking Link Interconnector project (Brakelmann and Stammen, 2016; Viking Link, 2017) for the purpose of cable installation in German waters showed the potential for an increase of 2°C at a sediment depth of 0.2 m above an operating cable as a worst-case scenario. In contrast, a study undertaken for NorthConnect project (2018) predicted that bundled cables buried at a depth of 0.5 m would result in a temperature rise of 1°C above background levels at the seabed level directly above the cable, decreasing with distance. Further information presented within the ES Addendum regarding potential heat emissions from the Marine Cables support the findings from other studies (document reference 7.8.1). The cables for the Proposed Development will be buried to a target burial depth of 1 m, and thermal assessment demonstrates that any substantial temperature increase will not be detectable at the seabed. Further, HDD methods propose target burial depth beneath the SAC (and this feature) is 5 m. HDD methods resulting in cable burial to 5 m are likely to maintain a higher temperature locally, however the cable will be contained within a duct and when considering the distance to the surface sediments, it is concluded that temperature increases will not be detectable at the surface. Therefore, there is no potential for LSE.
		Mudflats and sandflats not covered by seawater at low tide [1140]	N	As explained above when considering the possible effects of heat on Sandbanks which are slightly covered by sea water all the time, it is considered that temperature increases will not be detectable at the surface (due to HDD methods resulting in burial under the qualifying feature of 5 m). Therefore, there is no potential for LSE.
		Spartina swards [1320]	N	Temperature effects will not extend outwith the Marine Cable Corridor and as such no effects on this feature are likely. Therefore, there is no potential for LSE.
		Atlantic salt meadows [1330]	N	Temperature effects will not extend outwith the Marine Cable Corridor and as such no effects on this feature are likely. Therefore, there is no potential for LSE.
		Salicornia and other annuals colonising mud and sand [1310]	N	Temperature effects will not extend outwith the Marine Cable Corridor and as such no effects on this feature are likely. Therefore, there is no potential for LSE.

SAC	Effect	Feature	LSE?	Justification
	Hydrodynamic changes	Estuaries [1130]	N	A number of activities can affect hydrodynamic processes including installation of cable protection, removal of bedforms or the creation of depressions created through installation operations. More detail on the predicted hydrodynamic changes resulting from the Proposed Development can be found in Chapter 6 (Physical Processes) of the ES Volume 1 (APP-121). The Physical Processes assessment concluded that any hydrodynamic changes will be very small, highly localised and temporary resulting from near bed flow velocities and slightly elevated turbulence intensities as a result of the work. All work will be undertaken at and beyond the HDD entry/exit point KP1.0-KP1.6, and therefore outside of the overlap area with the Solent Maritime SAC (which is located at approx. KP 0.76), and there is adequate distance between the HDD and SAC (0.24 km) that it is predicted that the effects of any hydrodynamic changes within, effecting the qualifying features of the SAC are negligible. Therefore, there is no potential for LSE.
		Sandbanks which are slightly covered by sea water all the time [1110]	N	
		Mudflats and sandflats not covered by seawater at low tide [1140]	N	
		Spartina swards [1320]	N	
		Atlantic salt meadows [1330]	N	
		Salicornia and other annuals colonising mud and sand [1310]	N	
South Wight Maritime	Habitat disturbance	Submerged or partially submerged sea caves [8330]	N	No work associated with the Proposed Development will take place within the South Wight Maritime SAC. Therefore, there is no potential for habitat disturbance, and no potential for LSE.
		Reefs [1170]	N	
	Increased SSC	Submerged or partially submerged sea caves [8330]	Y	During dredge disposal, peak SSC of 1000 mgl^{-1} could arise within 1 km from the release point but coarser sediment expected to fall out of suspension quickly (almost immediately) with significant reductions of SSC within hours of disposal at each location. Beyond 1 km from release, the passive plume which is transported beyond this is likely to generate SSC in the region of approximately 20 mgl^{-1}, transported in the direction of the prevailing flow out to a distance of c. 25km. SSC is predicted to reduce to <1 – 6 mgl^{-1} within a few days following completion of disposal activities. Background SSC coastal areas is 5 to 75 mgl^{-1} (Chapter 6 Physical Processes). Other cable installation activities (including for repair and maintenance) also have the potential to raise SSC in the vicinity of the work. It is predicted that peak SSCs of up to 200 mgl^{-1} may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl^{-1} are predicted. SSC is expected to return to background levels within a few days following completion of these activities. The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl^{-1}) and therefore not discernible above natural variation. The closest example of this feature is 10 km from the UK Marine Cable Corridor and it is considered that the potential for LSE (at any stage) on this feature cannot be ruled out.
		Reefs [1170]	Y	During dredge disposal, peak SSC of 1000 mgl^{-1} could arise within 1 km from the release point but coarser sediment expected to fall out of suspension quickly (almost immediately) with significant reductions of SSC within hours of disposal at each location. Beyond 1 km from release, the passive plume which is transported beyond this is likely to generate SSC in the

SAC	Effect	Feature	LSE?	Justification
				region of approximately 20 mgl^{-1}, transported in the direction of the prevailing flow out to a distance of c. 25km. SSC is predicted to reduce to background levels (<1 – 6 mg/l) within the timeframe of a few days following completion of disposal activities. Other cable installation activities (including for repair and maintenance) also have the potential to raise SSC in the vicinity of the work. It is predicted that peak SSCs of up to 200 mgl^{-1} may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl^{-1} are predicted. SSC is expected to return to background levels within a few days following completion of these activities. The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl^{-1}) and therefore not discernible above natural variation. The closest example of this feature is 3.3 km from the Marine Cable Corridor and it is considered that the potential for LSE (at any stage) on this feature cannot be ruled out.
	Deposition of sediment (smothering)	Submerged or partially submerged sea caves [8330]	Y	Sediment deposition from disposal activities will be local to the point of release (i.e. within 1000 m), with deposits of coarser sediments potentially observed to depths of between 10 mm and 1.5 m, with greatest deposition observed across an area of a few hundred metres, elongated in the direction of the prevailing flow at the time of release, relative to the release site. Other cable installation activities (including for repair and maintenance) also have the potential to result in sediment deposition. Finer sediments will be redistributed and any deposition outside the Marine Cable Corridor are predicted to be transient and negligible, with any settled material being quickly redistributed under the forcing of tidal flows. Due to the distance from the proposed activities (10 km), it is considered that LSE (at any stage) on this feature cannot be ruled out.
		Reefs [1170]	Y	Sediment deposition from disposal activities will be local to the point of release (i.e. within 1000 m), with deposits of coarser sediments potentially observed to depths of between 10 mm and 1.5 m, with greatest deposition observed across an area of a few hundred metres, elongated in the direction of the prevailing flow at the time of release, relative to the release site. Finer sediments will be redistributed and any deposition outside the Marine Cable Corridor are predicted to be transient and negligible, with any settled material being quickly redistributed under the forcing of tidal flows. Other cable installation activities (including for repair and maintenance) also have the potential to result in sediment deposition. Due to the distance from the proposed activities (3.3 km), it is considered that LSE (at any stage) on this feature cannot be ruled out.
	Habitat loss	Submerged or partially submerged sea caves [8330]	N	No work will be undertaken within the South Wight Maritime SAC and therefore there is no potential for habitat loss, and no potential for LSE.

SAC	Effect	Feature	LSE?	Justification
		Reefs [1170]	N	Habitat loss as a result of sediment deposition has been considered but it is determined that any deposition will not result in potential for habitat loss via change to another sediment type or seabed type as any deposition that does occur will be of similar sediment types, and would not be of a level to cause a change in seabed type or profile (see assessment of LSE for sediment deposition for details of predicted levels).
	Pollution	Submerged or partially submerged sea caves [8330]	Y	Marine litter is any manufactured or processed solid material from anthropogenic activities discarded, disposed or abandoned (excluding legitimate disposal) once it enters the marine and coastal environment including plastics, metals, timber, rope, fishing gear etc. and their degraded components, e.g. microplastic particles (Natural England, 2019). Ecological effects can be physical (smothering), biological (ingestion, including uptake of microplastics; entangling; physical damage; accumulation of chemicals) and/or chemical (leaching, contamination). Marine litter can be released into the marine environment by shipping vessels either accidentally (inappropriate storage) or deliberately (Potts and Hasting, 2011; Lozano and Mouat, 2009). Shipping related litter contributes approximately 2% of the litter found on UK beaches. Deliberate discharges of oil or oil/water mixtures and synthetic compounds from ships are prohibited in all waters around the UK and its approaches. However, accidental discharges still occur. Drilling fluid, usually consisting of water and clay material (bentonite) will be used as a lubricant. Whilst methods can be employed to minimise the risk, leakage or outbreaks of these materials into the environment can occur. It is therefore considered that the potential for LSE as a result of pollution (including litter) cannot be ruled out.
		Reefs [1170]	Y	
	Invasive species	Submerged or partially submerged sea caves [8330]	Y	The introduction and spread of INIS can occur directly through the release of individuals of INIS species into the environment via activities, e.g. through release of ballast water (Ware, 2009), on the hull of ships even if recently cleaned or anti-fouled (IMO, 2012; Davidson *et al*., 2010), or indirectly by creating opportunities for organisms to settle or spread (e.g. habitat creation or disturbance), thereby allowing for them to out-compete native species. The Proposed Development will increase local traffic, disturb the seabed and introduce new hard substrate (in the form of cable protection), which has the potential to influence the introduction and spread of INIS. However, this area is a busy shipping channel and already possesses significant hard substrate modifications for navigation, ports and flood protection measures. There are several INIS species known to be present in the Marine Cable Corridor, such as the slipper limpet, *Crepidula fornicata*, Pacific oyster (*Crassostrea (Magallana) gigas*), Chinese mitten crabs (*Eriocheir sinensis*), wire weed (*Sargassum muticum*), and the leathery sea squirt (*styela clava*) (Eno *et al*., 1997; GB Non-Native Species Secretariat, 2019).
		Reefs [1170]	Y	

SAC	Effect	Feature	LSE?	Justification
				It is therefore considered that the potential for LSE as a result of INIS cannot be ruled out.
	EMF	Submerged or partially submerged sea caves [8330]	N	EMF effects will not extend outwith the Marine Cable Corridor and as such no effects on this feature are likely. Therefore, there is no potential for LSE.
		Reefs [1170]	N	EMF effects will not extend outwith the Marine Cable Corridor and as such no effects on this feature are likely. Therefore, there is no potential for LSE.
	Increased light Pollution	Submerged or partially submerged sea caves [8330]	N	The South Wight Maritime SAC lies over 3 km from the Proposed Development, and there is no potential for increased light to be present at a level that may affect Annex I habitat features. Therefore, it is concluded that there is no potential for LSE.
		Reefs [1170]	N	
	Resuspension of contaminated sediments	Submerged or partially submerged sea caves [8330]	N	Results from the subtidal contaminated sediment survey (Chapter 7 Marine Water and Sediment Quality), indicate that the sediments within the Marine Cable Corridor do not contain significantly elevated levels of contaminants with no records of any contaminant exceeding Cefas Action Level 2. In addition, for all contaminants other than Arsenic, no exceedance of Action Level 1 was recorded. Arsenic did exceed Action Level 1 at two locations (although only at one of these was it above the OSPAR Background Assessment Concentration) however these appear isolated areas and with no indication of a pattern or common source. Evidence from the nearby IFA2 interconnector and Rampion OWF projects also suggests that the wider area is not heavily contaminated despite the long history of port, heavy shipping, and military activity in the area. The lack of contamination in the nearshore sediments within the Marine Cable Corridor indicates that there is a very low risk of sediment borne contaminants being re-released into the water column. As such, it is therefore concluded that there is no potential for LSE.
		Reefs [1170]	N	
	Temperature changes	Submerged or partially submerged sea caves [8330]	N	Temperature effects will not extend outwith the Marine Cable Corridor and as such no effects on this feature are likely. Therefore, there is no potential for LSE.
		Reefs [1170]	N	
	Hydrodynamic changes	Submerged or partially submerged sea caves [8330]	N	A number of activities can affect hydrodynamic processes, from installation of rock protection, the removal of bedforms, and from depressions created through installation operations. More detail on the predicted hydrodynamic changes resulting from the Proposed Development can be found in Chapter 6 Physical Processes.
		Reefs [1170]	N	

SAC	Effect	Feature	LSE?	Justification
				The Physical Processes assessment concluded that any hydrodynamic changes will be very small, highly localised and temporary resulting from near bed flow velocities and slightly elevated turbulence intensities as a result of the work. The Proposed Development is over 3 km from the boundary of the SAC, and it is therefore predicted that that any effects due to any hydrodynamic changes are negligible, and therefore it is concluded that there is no potential for LSE.
	Noise and Vibration	Reefs [1170]	N	Vessel movement is an important source of underwater noise (OSPAR Commission, 2009). Activities resulting in vibration include trenching for cable laying (Department for Business Enterprise and Regulatory Reform (BERR), 2008; Robinson *et al.*, 2011), and dredging (Robinson *et al.*, 2011). This pressure is only relevant to birds and sea mammals that spend time on land for breeding purposes (haul-outs), and is not relevant to most benthic habitats, however for intertidal rock habitats, some benthic species can perceive noise and vibration (e.g. crabs). Any noise and vibration from cable installation will be of low magnitude (OSPAR, 2009) and elevations above background are unlikely to extend beyond the Marine Cable Corridor (Nedwell *et al.*, 2003). Therefore, it is concluded that there is no potential for LSE.

7.2.2. ANNEX II DIADROMOUS MIGRATORY FISH

Salmon

7.2.2.1. Salmon are an interest feature of a number of SACs/Ramsar where connectivity may exist with the potential effects identified for the Proposed Development. All sites within the study area which list salmon as qualifying features are listed below:

- River Itchen SAC;
- River Avon SAC;
- Estuaire de la Seine SAC/Marias Vernier Ramsar;
- Baie de Canche et Couloir des trois Estuaires SAC; and
- Baie de Seine Orientale SAC.

7.2.2.2. Salmon have a high degree of site fidelity and will return as adults to spawn in the same river where they were born. It is considered that although salmon are destined for specific rivers in the UK (or France) they are the same species and therefore sensitive to the same effects.

7.2.2.3. Effects for which salmon have been identified as potentially sensitive (Table 7.2) for both the construction (and decommissioning) and also operational (maintenance and repair) phases of the Proposed Development (Table 7.3) are as follows:

7.2.2.4. Construction (and decommissioning)

- Increased SSC;
- Physical injury;
- Invasive species;
- Pollution events;
- Noise and vibration; and
- Visual disturbance.

7.2.2.5. Operation (repair and maintenance)

- Increased Suspended Sediment Concentrations (SSC);
- Physical injury;
- Invasive species;
- Pollution events;
- Noise and vibration;
- Visual disturbance;
- EMF; and

- Temperature changes.

7.2.2.6. Once installation is complete the buried (or protected) cables will have a life expectancy of at least 40 years. The Proposed Development has been designed so that routine maintenance to the Marine Cables is not required during their operational lifetime. However, there may be the requirement to undertake unplanned repair works. Therefore, during the operation phase of the Proposed Development, the effects are expected to be no greater than that of the construction phase.

7.2.2.7. Where those effects assessed for construction are not considered to lead to LSE on the features of this site during construction (or decommissioning), they will not be assessed again for operation. Two additional effects relevant to salmon and specific to the operational phase of a power cable are EMFs and temperature changes, and these effects will be assessed accordingly.

Table 7.2 - LSE Assessment for Salmon during Construction and Decommissioning from the Proposed Development

SAC/ZSC/Ramsar	Effect	Assessment	Potential for LSE? Y/N
River Itchen **River Avon** **Estuaire de la Seine SAC/Marais Vernier Ramsar** **Baie de Canche et Couloir des trois** **Baie de Seine Orientale**	**Increased SSC**	The potential impact of increased SSC relates to the sediment released as a result of the cable installation and associated works such as dredge and disposal activities, route clearance and rock placement for both the Marine Cable Corridor and Landfall. Salmon are known to use the coast for migration and there is the possibility that an increase in SSC could pose a barrier to their migration or cause respiratory effects from depleted oxygen. LSE cannot be fully ruled out for this impact and it will be progressed to AA stage for the River Itchen and River Avon only. Interest features from French sites are not considered to be affected as SSC increases are not predicted to result in a barrier effect to salmon migration. Therefore, no LSE is determined for Estuaire de la Seine SAC/Marais Vernier Ramsar, Baie de Canche et Couloir des trois Estuaires and Baie de Seine Orientale SACs.	Y (UK sites only)
	Physical injury	The construction (and decommissioning) phase of the Proposed Development will require the use of construction vessels which may pose a collision risk to salmon. It is considered however that as this species (both adult and smolts) is highly mobile and has the innate ability to avoid areas of increased vessel traffic the possibility of this impact is occurring is extremely low. In addition, there is a lack of publicly available literature on this subject which indicates it is not an area of interest or concern. Although a potential route to impact exists, the likelihood of the impact occurring is considered to be extremely low and the effects are predicted to be negligible. It is therefore concluded that the impact will not lead to LSE on the River Itchen, River Avon, Estuaire de la Seine SAC/Marais Vernier Ramsar, Baie de Canche et Couloir des trois Estuaires and Baie de Seine Orientale.	N
	Invasive species	The introduction of invasive species can be harmful to indigenous populations in locations where they do not naturally occur. As a number of vessels will be required for the construction (and operation and decommissioning) of the cables and associated equipment, there is the possibility that invasive species may be introduced via biofouling or ballast water which are harmful to salmon. The introduction of non-native migratory fish species has the potential to increase competition for spawning grounds with domestic salmon stocks and potentially reduce recruitment. In addition, the introduction of non-native parasites could also have negative effects on salmon stocks. An example of this is the capture of non-native pink salmon (*Oncorhynchus gorbuscha*) in Scottish and Northumberland rivers (Tweed and Tyne) although this cannot be attributed to ship ballast water but rather an adult migration across the North Sea from North Norway. There is a lack publicly available literature on the introduction on non-native parasites which are harmful to salmon. It is considered unlikely that non-native species will be introduced as a result of construction vessels operating in the near and offshore sections of the Proposed Development, and it is highly unlikely that any of these will be harmful to salmon. It is concluded therefore that the potential introduction of non-native species as a result of the Proposed Development alone, will not lead to an LSE on the River Itchen SAC, River Avon SAC, Estuaire de la Seine SAC/Marais Vernier Ramsar, Baie de Canche et Couloir des trois Estuaires SAC and Baie de Seine Orientale SAC.	N
	Pollution Events	Pollution as a result of installation (operational and decommissioning) activities such as litter and contamination (hydrocarbons, PAH, pesticides, anti-foulants, pharmaceuticals) from installation vessels and release of liquids (bentonite) from HDD operations may have effects on salmon (and smolts) whilst they are migrating to or from their natal rivers. LSE cannot be fully ruled out for this impact and it will be progressed to AA stage.	Y

SAC/ZSC/Ramsar	Effect	Assessment	Potential for LSE? Y/N
		Historic pollution in the form of contaminated sediments (i.e. transition elements and organo-metals) is not considered to have the potential to lead to LSE as the area of work is not highly contaminated.	
	Noise and vibration	The impact of noise and vibration may occur as a result of cable installation (and decommissioning) activities (cable laying and cable protection) and Landfall activities (HDD, vibro-hammering of four 36" steel casings and support lattices). Salmon are classed as hearing generalists with the swim bladder playing no part in hearing. Hawkins *et al.* (1978) showed that salmon have a relatively low sensitivity to noise with a narrow frequency span and limited ability to discriminate between sounds. In addition, Harding *et al*. (2016) found an absence of stress response in captive fish exposed to piling playback in tank-based experiments. Generally, the maximum sound pressure levels (SPLs) relating to installation of a marine cable are moderate to low (OSPAR, 2009). Nedwell *et al.* (2003) found that the noise emitted from cable trenching at North Hoyle OWF was 123 dB re 1 µPa (at a range of 160 m). Both HDD and vibro hammering/pile driving (used for steel casings and supporting trestles at the Landfall) are considered to produce substantially less underwater noise than impact piling. Nedwell *et al*. (2012) found that underwater noise monitoring of HDD operating 39 m below a river resulted in levels of 129.5 dB re 1 µPa on the riverbed. It was noted however that due to the shallow water conditions the sound attenuated rapidly, in addition there was no shipping noise present. It is likely that HDD operations for the Proposed Development will be result in similar noise levels. Nedwell *et al*. (2003) found no discernible increase in underwater noise from an active vibropiling rig at a distance of 417.4 m against the background noise of Town Quay, Southampton with caged brown trout (*Salmo trutta*) showing no reaction to active vibro piling even at close range (<50m). Popper *et al*. (2014) recommended guidelines for assessing shipping and other continuous noises, with cable laying, vibro piling and HDD considered to fall within this category. Fish with swim bladders not involved in hearing, such as salmon, were assigned a low risk to mortality, potential mortal injury and recoverable injury near to the source from continuous sound sources. Given salmon's low sensitivity to underwater noise and vibration, construction (operation and decommissioning) these are not considered to result in any significant barrier effects. As salmon have a low sensitivity to noise / vibration and are at low risk from mortality and injury as a result of trenching operations, HDD and vibro piling it is concluded that this impact as a result of the Proposed Development alone, will not lead to LSE on the River Itchen SAC, River Avon SAC, Estuaire de la Seine SAC/Marais Vernier Ramsar, Baie de Canche et Couloir des trois Estuaires and Baie de Seine Orientale SACs.	N
	Visual Disturbance	The impact of visual disturbance during installation (and decommissioning) to salmon could potentially occur due to the increase in vessels including jack up vessels as part of HDD works, installation equipment on the seabed (grapnels, displacement ploughs, trenching tools including MFE) and attachment lines / anchors. Salmon, like most fish, are highly adapted to detect changes in the visual environment with visual stimuli such as vessels potentially evoking a disturbance response which may incur unnecessary stress and use of energy. The common reaction to a potentially harmful situation is to escape and gain distance from the source; with fish this is often presented by fleeing to deeper water (Ali, 1961). Flight behaviours are characterised by fast-start swimming which is a high energy burst and rapid acceleration in swimming speed usually away from the disturbance (Domenici and Blake, 1997). The duration of response and therefore stress, is a reflection of the potential risk versus the cost of avoidance with stress levels increasing dependent on the time the fish is exposed to the stimuli (Endler, 1991).	N

SAC/ZSC/Ramsar	Effect	Assessment	Potential for LSE? Y/N
		Bui *et al.* (2013) found that surface disturbance in a cage of farmed salmon elicited avoidance of the surface by individuals but, it did not produce flight responses and elevated swimming speeds seen in other stimuli such as the introduction of light. With this in mind it is likely that salmon in the Solent are accustomed to vessel traffic (due to the area being subject to high shipping / vessel movements) and the presence of vessels towing equipment (e.g. commercial fishing vessels) and will simply navigate round or under any installation vessels with minimal stress. In light of the above it is concluded that salmon will be largely unaffected by this impact as a result of the Proposed Development alone, and this impact is predicted not to result in a LSE on the River Itchen SAC, River Avon SAC, Estuaire de la Seine SAC/Marais Vernier Ramsar, Baie de Canche et Couloir des trois Estuaires SAC and Baie de Seine Orientale SAC.	

Table 7.3 - LSE Assessment for Salmon during Operation (including Repair and Maintenance)

SAC/ZSC/Ramsar	Effect	Assessment	Potential for LSE? Y/N
River Itchen **River Avon** **Estuaire de la Seine SAC/Marais Vernier Ramsar** **Baie de Canche et Couloir des trois** **Baie de Seine Orientale**	EMF	The potential impact of EMF could occur as a result of the operation of the HVDC interconnector cables. The predicted field strength for EMF around the cables is 42 µT at 1 m depth, with the proposed minimum burial depth for the cables being 1 m. Adult salmon although generally surface dwelling are known to pass through a range of water depths whilst at sea (Godfrey *et al*., 2014); this is also true for smolts which swim close to the surface although they have been observed to make regular rapid changes in swimming depths (Westerberg, 1982; Reddin *et al*., 2006). Given their propensity to dive both adult salmon and smolts may be exposed to EMF produced by the operational cables installed as part of the Proposed Development. The effects of EMF on salmon was studied by Armstrong *et al*. (2015) who exposed captive salmon to EMF. The results showed that there was no identifiable behavioural response from salmon to a magnetic field of 95 µT. This magnetic field is more than double than that predicted for the Proposed Development (42µT) so no behavioural response is expected. In addition, the sea surface and pelagic nature of both salmon and smolts suggests they do not spend a great deal of time on or near the seabed and therefore exposure to the low levels of EMF predicted is unlikely but if it does occur any impact will be of short duration while transiting across the cables. In light of the above evidence it is concluded the effects from EMF as a result of the operation of the Proposed Development alone, will not lead to a LSE on the Salmon from the River Itchen SAC, River Avon SAC, Estuaire de la Seine SAC/Marais Vernier Ramsar, Baie de Canche et Couloir des trois Estuaires SAC and Baie de Seine Orientale SAC.	N
	Temperature Change	Heat is generated as electricity passes through cables as a result of the resistance of the conductor material. It is expected that during operation a small amount of heat will be produced by the Proposed Development. The effect of heat from subsea cables on salmon is not well documented however a study undertaken for the Nemo link HVDC (Nemo Link, 2013) cable calculated that localised temperature increases in the seabed above the cable would only be 1.2°C at 0.3 m depth and 0.7°C at 0.1 m depth from the seabed surface. Information presented within the ES Addendum regarding potential heat emissions from the Marine Cables support the findings from other studies (document reference 7.8.1). The cables for the Proposed Development will be buried to a target burial depth of 1 m, and the thermal assessment desomnstrates that any substantial temperature increase will not be detectable at the seabed. In addition, salmon (and smolts) generally swim near to the sea surface so interaction with any temperature increasesfrom the Proposed Development is unlikely. Given the minimal emission of heat which is expected to have little to no effect on salmon this impact will not lead to LSE on the River Itchen, River Avon, Estuaire de la Seine SAC/Marais Vernier Ramsar, Baie de Canche et Couloir des trois Estuaires and Baie de Seine Orientale.	N

Allis Shad and Twaite Shad

7.2.2.8. Both allis and twaite shad have almost identical physiology and exhibit similar biological traits such as being migratory and spawning in freshwater. As the same potential effects are identified for both species they have been assessed together in the following section.

7.2.2.9. Allis shad are an interest feature of a number of SACs where connectivity may exist with the potential effects identified for the Proposed Development. Twaite shad are also a feature of three French SACs and a Ramsar. All SACs within the study area which list twaite and/or allis shad as qualifying features are listed below:

- Plymouth Sound and Estuaries SAC (allis shad);
- Estuaire de la Seine SAC/Marais Vernier Ramsar (twaite shad);
- Baie de Canche et Couloir des trois Estuaires SAC (allis shad);
- Baie de Seine Orientale SAC (both allis and twaite shad); and
- Littoral Cauchois SAC (twaite shad).

7.2.2.10. There is some evidence that this species returns to its natal river to spawn with some genetic integrity (Quignard *et al*., 1991) with Martin *et al.* (2015) showing a high level of site fidelity for these species. It is likely therefore that individual allis and twaite shad are destined for a particular catchment or SAC.

7.2.2.11. Effects for which both shad species have been identified as potentially sensitive (Table 7.4) for both the construction (and decommissioning) and also operational (Repair and Maintenance) phases of the Proposed Development (Table 7.5) are as follows:

7.2.2.12. Construction (and decommissioning)

- Increased SSC;
- Physical injury;
- Invasive species;
- Pollution events;
- Noise and vibration; and
- Visual disturbance.

7.2.2.13. Operation (repair and maintenance)

- Increased SSC;
- Physical injury;
- Invasive species;
- Pollution events;

- Noise and vibration;
- EMF; and
- Temperature changes.

7.2.2.14. Once installation is complete the buried (or protected) cables will have a life expectancy of at least 40 years. The Proposed Development has been designed so that routine maintenance to the Marine Cables is not required during their operational lifetime. However, there may be the requirement to undertake unplanned repair works. Therefore, during the operation phase of the Proposed Development, the effects are expected to be no greater than that of the construction phase.

7.2.2.15. Where those effects assessed are not considered to lead to LSE on the features of this site during construction (or decommissioning), they will not be assessed again for operation as it is considered that no LSE will arise. Two additional effects relevant to shad and specific to the operational phase of a power cable are EMF and temperature changes, and these effects will be assessed accordingly.

Table 7.4 - LSE Assessment for Allis Shad and Twaite Shad during Construction and Decommissioning of the Proposed Development alone

SAC/ZSC/Ramsar	Effect	Assessment	Potential for LSE? Y/N
Allis shad: Plymouth Sound and Estuaries SAC Baie de Canche et Couloir des trois Estuaires SAC Baie de Seine Orientale SAC **Twaite shad:** Baie de Seine Orientale SAC Estuaire de la Seine SAC/Marais Vernier Ramsar Littoral Cauchois SAC	**Increased SSC**	The potential impact of increased SSC relates to the sediment released as a result of the burial of the cable and associated works such as dredging (both offshore and at Landfall), the deposit of dredged material, route clearance and rock placement. The worst case for increased SSC is considered to arise through deposit of dredge material which may be required for sandwave clearance, prior to cable installation. During dredge disposal, peak SSC of 1000 mgl^{-1} could arise within 1 km from the release point but coarser sediment expected to fall out of suspension quickly (almost immediately) with significant reductions of SSC within hours of disposal at each location. Beyond 1 km from release, the passive plume which is transported beyond this is likely to generate SSC in the region of approximately 20 mgl^{-1}, transported in the direction of the prevailing flow out to a distance of c. 25km. SSC is predicted to reduce to background levels (<1 – 6 mg/l) within the timeframe of a few days following completion of disposal activities. Shad are known to be present in all ICES rectangles in the Channel with numbers identified in commercial fisheries data. This is likely to include both allis and twaite shad. Given their wide dispersal within the Channel they are potentially at risk from increased SSC from the Proposed Development both coastally and offshore. SSC could pose a barrier to their migration or respiratory effects from depleted oxygen. Publicly available literature on the effects of suspended sediment on both shad species is scarce however Kjelland *et al.* (2015) identified that fish in general are more likely to undergo sub lethal stress from SSC as they have the ability to move away from an impacted area. In addition, both shad species spawn in a riverine environment so will be inherently tolerant of naturally high and variable background levels of suspended. Both allis and twaite shad are most likely to navigate around or through areas of elevated sediment with minimal impact on their migration. With this in mind and considering the relatively localised (peak SSCs are experienced within 1 km from disposal event) and short and temporary nature (reducing to background levels in minutes to days) of this effect, no barrier to allis and twaite shad migration is expected. It is concluded therefore that the increase in SSC from construction will not lead to LSE on the Plymouth Sound and Estuaries SAC, Baie de Canche et Couloir des trois Estuaires SAC, Baie de Seine Orientale SAC, Estuaire de la Seine SAC/Marais Vernier Ramsar and Littoral Cauchois SAC.	N
	Physical injury	The construction (operation & maintenance and decommissioning) phase of the Proposed Development will require the use of construction vessels which may pose a collision risk to allis and twaite shad. It is considered however that as both allis and twaite shad are highly mobile and therefore have the ability to avoid areas of increased vessel traffic (which are predicted to be relatively low when compared to background levels of traffic in the Solent area), the potential for physical injury to occur is extremely low. Although a potential route to impact technically exists, the likelihood is predicted to be very low and the effects are predicted to be negligible. Therefore, it is concluded that the Proposed Development alone, will not lead to a LSE on the Plymouth Sound and Estuaries SAC, Baie de Canche et Couloir des trois Estuaires SAC, Baie de Seine Orientale SAC, Estuaire de la Seine SAC/Marais Vernier Ramsar and Littoral Cauchois SAC.	N
	Invasive species	The introduction of invasive species can be harmful to indigenous populations in locations where they do not naturally occur. As a number of vessels will be required for the installation (and pre installation) of the cable there is the possibility that invasive species may be introduced via biofouling or ballast water which are harmful to allis and twaite shad. The introduction of non-native migratory fish species has the potential to increase competition for spawning grounds, predate on eggs or juvenile domestic allis and twaite shad stocks and potentially reduce recruitment. In addition, the introduction of non-native parasites could also have negative effects on allis and twaite shad stocks. Maitland (2003) highlighted that rainbow trout (*Oncorhynchus mykiss*) which have escaped from fish farms can be an issue in allis and twaite shad rivers, however	N

SAC/ZSC/Ramsar	Effect	Assessment	Potential for LSE? Y/N
		there is no publicly available literature on vessel born non-native species which are specifically harmful to allis and twaite shad. This is also true for non-native parasites. Although unlikely it is possible that non-native species may be introduced as a result of installation vessels operating in the near and offshore sections of the Proposed Development, however it is highly unlikely that any of these will be harmful to allis and twaite shad. It is concluded therefore that the potential introduction of non-native species will not lead to a LSE on the Plymouth Sound and Estuaries SAC, Baie de Canche et Couloir des trois Estuaires SAC, Baie de Seine Orientale SAC, Estuaire de la Seine SAC/Marais Vernier Ramsar and Littoral Cauchois SAC.	
	Pollution Events	Pollution as a result of installation (operational and decommissioning) activities such as litter and contamination (hydrocarbons, Pesticides and PAHs), pesticides, anti-foulants, pharmaceuticals, transition elements and organo-metals) from installation vessels and release of liquids (bentonite) from HDD operations may have effects on allis and twaite shad whilst they are migrating to or from their natal rivers. As LSE cannot be fully ruled out this effect will be progressed to AA stage. Historic pollution in the form of contaminated sediments (i.e. transition elements and organo-metals) as a result of re-suspension is not considered to have the potential to lead to LSE as the area is not highly contaminated.	Y
	Noise and vibration	The impact of noise and vibration may occur as a result of cable installation (and decommissioning) activities (cable laying and cable protection) and Landfall activities (HDD, vibro hammering/pile driving of four 36” steel casings and support lattices). Although no noise emissions for the Proposed Development are available Nedwell *et al*. (2003) found that the noise emitted from cable trenching at North Hoyle OWF was 123 dB re 1 µPa (at a range of 160 m). In terms of noise and vibration from Landfall activities Nedwell *et al*. (2012) found that underwater noise monitoring of HDD operating 39 m below a river resulted in levels of 129.5 dB re 1 µPa on the river bed and Nedwell *et al*. (2003) found no discernible increase in underwater noise from an active vibropiling rig at a distance of 417.4m against the background noise of Town Quay, Southampton. Both allis and twaite shad are a member of the herring family (Clupeidae) and are considered to be hearing specialists due to the coupling of the ear to the swim bladder. Mann et al, (2001) suggests this species has a hearing range between 10 Hz and 180 kHz. Popper *et al.* (2014) recommended guidelines for shipping and other continuous noises, with cable laying, HDD and vibropiling considered to fall within this category. Fish with a swim bladder involved in hearing (primarily pressure detection), such as allis and twaite shad, were assigned a low risk to mortality and potential mortal injury. In addition, recoverable injury may occur at 170 dB re 1 µPa for 48 hours and temporary threshold shift (‘TTS’) at 158 dB re 1 µPa for 12 hours from continuous sound sources. When comparing the expected noise levels from cable trenching (as identified by Nedwell *et al.*, 2003) and HDD with the guidelines by Popper *et al.* (2014) the risk of recoverable injury or TSS will only occur if an individual is closer than 160 m to the source for a period of hours. As both shad species are highly mobile and capable of hearing underwater noise, they are likely to move away from the impact before injury or TTS occurs. In addition, allis and twaite shad are generally pelagic and unlikely to be in proximity to the seabed, where cable trenching will occur, for any length of time. In light of this, the potential impact of noise and vibration form both cable installation and Landfall activities will not lead to an LSE on the Plymouth Sound and Estuaries SAC, Baie de Canche et Couloir des trois Estuaires SAC, Baie de Seine Orientale SAC, Estuaire de la Seine SAC/Marais Vernier Ramsar and Littoral Cauchois SAC.	N

SAC/ZSC/Ramsar	Effect	Assessment	Potential for LSE? Y/N
	Visual Disturbance	The impact of visual disturbance during installation (and decommissioning) to both allis and twaite shad could potentially occur due to the increase in vessels on the sea surface, installation equipment on the seabed (grapnels, displacement ploughs, trenching tools) and attachment lines. Allis and twaite shad, like most fish, are highly adapted to detect changes in the visual environment with visual stimuli such as vessels potentially evoking a disturbance response which may incur unnecessary stress and use of energy. The common reaction to a potentially harmful situation is to escape and gain distance from the source with fish this is often presented by fleeing to deeper water (Ali, 1961). Flight behaviours are characterised by fast-start swimming which is a high energy burst and rapid acceleration in swimming speed usually away from the disturbance (Domenici and Blake, 1997). The duration of response and therefore stress, is a reflection of the potential risk versus the cost of avoidance with stress levels increasing dependent on the time the fish is exposed to the stimuli (Endler, 1991). There is limited (if any) literature on the effects of visual disturbance from vessels on both species of shad. It is however considered that they will exhibit a similar response to most fish which is to navigate around or under the vessel. The effects of this are unlikely to be stressful with the Solent being a busy shipping area and both species of shad likely to be habituated to such disturbance. In light of this the potential impact from visual disturbance will not lead to an LSE on the Plymouth Sound and Estuaries SAC, Baie de Canche et Couloir des trois Estuaires SAC, Baie de Seine Orientale SAC, Estuarie de la Seine SAC/Marais Vernier Ramsar and Littoral Cauchois SAC.	**N**

Table 7.5 - LSE Assessment for allis and twaite shad during Operation (including Repair and Maintenance)

SAC/ZSC/Ramsar	Effect	Assessment	Potential for LSE? Y/N
Allis Shad: Plymouth Sound and Estuaries SAC Baie de Canche et Couloir des trois Estuaires SAC Baie de Seine Orientale SAC **Twaite Shad:** Baie de Seine Orientale SAC Estuaire de la Seine SAC/Marais Vernier Ramsar Littoral Cauchois SAC	EMF	The potential impact of EMF could occur as a result of the operation of the Proposed Development. The predicted field strength for EMF around the cables is 42 µT at 1 m depth. As this is the minimum buried depth of the cables proposed this is considered to be the worst case. Publicly available literature on the effects of EMF on both species of shad is scarce (or non-existent). Elasmobranches on the other hand are known to be electroreceptive due to the presence of Ampullae of Lorenzini which allow this group of fishes to detect very weak voltage gradients which are used for prey detection. Both allis and twaite shad do not possess ampullary organs but rely on sight and sensory detection to find prey. They are also pelagic and do not depend on the seabed for feeding and are therefore unlikely to be exposed to EMF from the Proposed Development. In light of the above, the potential impact of EMF will not lead to LSE on the Plymouth Sound and Estuaries SAC, Baie de Canche et Couloir des trois Estuaires SAC, Baie de Seine Orientale SAC, Estuaire de la Seine SAC/Marais Vernier Ramsar and Littoral Cauchois SAC.	N
	Temperature Change	Heat occurs during the transport of electricity through cables as a result of the resistance of the conductor material. It is expected that during operation a small amount of heat will be produced by the Proposed Development. There is little (if any) publicly available literature on the effects of heat from subsea cables on both species of shad. However, Hundt *et al.* (2015) investigated the effect of heat on larval stages of allis and twaite shad in freshwater which showed that optimal temperatures for growth performance was between 24 ºC and 28 ºC. Although this relates to freshwater, the larval stages of fish are often the most sensitive to any impact with adults likely to be more tolerant. A study undertaken for the Nemo link HVDC (Nemo Link, 2013) cable calculated that localised temperature increases in the seabed above the cable would only be 1.2°C at 0.3 m depth and 0.7°C at 0.1 m depth from the seabed surface. Information presented within the ES Addendum regarding potential heat emissions from the UK Marine Cables support the findings from other studies (document reference 7.8.1). The cables for the Proposed Development will be buried to a minimum depth of 1 m and the thermal assessment deomnstrates that any substantial temperature increase will not be detectable at the seabed. In addition, allis and twaite shad generally swim near to the sea surface so interaction with any heat emissions from the Proposed Development is unlikely. Given the minimal emission of heat expected which is expected to have little to no effect on allis and twaite shad this impact will not lead to LSE on the Plymouth Sound and Estuaries SAC, Baie de Canche et Couloir des trois Estuaires SAC, Baie de Seine Orientale SAC, Estuaire de la Seine SAC Marais Vernier Ramsar and Littoral Cauchois SAC.	N

Sea Lamprey and River Lamprey

7.2.2.16. Both sea and river lamprey have similar physiology and exhibit similar biological traits such as being migratory and spawning in freshwater. As the same potential effects are identified for both species they have been assessed together in the following section.

7.2.2.17. Sea lamprey and river lamprey are an interest feature of a number of SACs and a Ramsar where connectivity may exist with the potential effects identified for the Proposed Development. All sites within the study area which list sea lamprey and/or river lamprey as qualifying features are listed below:

- River Avon SAC (sea lamprey);
- River Axe SAC (sea lamprey);
- Littoral Cauchois SAC (sea lamprey and river lamprey);
- Estuaires et Littoral Picards (Baies de Somme et d'Authie) SAC (river lamprey);
- Estuaire de la Seine SAC/Marais Vernier Ramsar (sea lamprey and river lamprey);
- Baie de Canche et Couloir des trois Estuaires SAC (sea lamprey and river lamprey); and
- Baie de Seine Orientale SAC (sea lamprey and river lamprey).

7.2.2.18. Sea lamprey show limited site fidelity which is thought to be due to its parasitic adult life phase as cohorts become widely dispersed through transport by the diverse range of species they parasitize (Waldman *et al*., 2008). There is therefore no way of attributing individuals to specific SACs. Despite this novel approach to spawning site selection, sea lamprey belong to the same species and are therefore sensitive to the same effects regardless of the SAC for which they are qualifying feature.

7.2.2.19. River lamprey on the other hand are generally considered to use estuaries and coastal environments during their adult stages however the degree of spawning site fidelity is unknown.

7.2.2.20. Effects for which both sea and river lamprey have been identified as potentially sensitive (Table 7.6) for both the construction (and Decommissioning) and also operational (Repair and Maintenance) phases of the Proposed Development (Table 7.7) are as follows:

7.2.2.21. Construction (and decommissioning)

- Increased SSC;
- Physical injury;
- Invasive species;
- Pollution events; and

- Noise and vibration.

7.2.2.22. Operation (repair and maintenance)

- Increased SSC;
- Physical injury;
- Invasive species;
- Pollution events;
- Noise and vibration;
- EMF; and
- Temperature changes.

7.2.2.23. Once installation is complete the buried (or protected) cables will have a life expectancy of at least 40 years. The Proposed Development has been designed so that routine maintenance to the Marine Cables is not required during their operational lifetime. However, there may be the requirement to undertake unplanned repair works. Therefore, during the operation phase of the Proposed Development, the effects are expected to be no greater than that of the construction phase.

7.2.2.24. Where those effects assessed are not considered to lead to LSE on the features of this site during construction (or decommissioning), they will not be assessed again for operation as it is considered that no LSE will arise. One additional effect relevant to lamprey species and specific to the operational phase of a power cable is EMF, and this effect will be assessed accordingly.

Table 7.6 - LSE Assessment for Sea lamprey and River lamprey during Construction and Decommissioning

SAC/ZSC/Ramsar	Effect	Assessment	Potential for LSE? Y/N
Sea Lamprey: River Avon SAC River Axe SAC Littoral Cauchois SAC Estuaire de la Seine SAC/Marais Vernier Ramsar Baie de Canche et Couloir des trois Estuaires SAC Baie de Seine Orientale SAC **River Lamprey:** Littoral Cauchois SAC Estuaire de la Seine SAC/Marais Vernier Ramsar Estuaires et Littoral Picards (Baies de Somme et d'Authie) SAC Baie de Canche et Couloir des trois Estuaires SAC Baie de Seine Orientale SAC	**Increased SSC**	The potential impact of increased SSC relates to the sediment released as a result of the cable installation and associated works such as dredge and disposal activities, route clearance and rock placement for both the Marine Cable Corridor and Landfall. Lamprey are known to use the coastal waters and there is the possibility that an increase in SSC could pose a barrier to their migration or cause respiratory effects from depleted oxygen. As LSE cannot be fully ruled for the River Axe and River Avon, this impact will be progressed to AA stage. Due to the distance between the French sites, it is not considered that increases in SSC will result in any significant effect on the qualifying features e.g. barrier effects.	Y (UK sites only)
	Physical injury	The construction (and decommissioning) phase of the Proposed Development will require the use of construction vessels which may pose a collision risk to lamprey. It is considered however that given lampreys (both adult and transformers) are highly mobile and therefore have the innate ability to avoid areas of increased vessel traffic the possibility of this impact is extremely low. Although a potential route to impact exists this will not lead to LSE on the River Avon SAC, River Axe SAC, Littoral Cauchois SAC, Estuaire de la Seine SAC/Marais Vernier Ramsar, Estuaires et Littoral Picards (Baies de Somme et d'Authie) SAC, Baie de Canche et Couloir des trois Estuaires SAC and Baie de Seine Orientale SAC.	N
	Invasive species	The introduction of invasive species can be harmful to indigenous populations in locations where they do not naturally occur. As a number of vessels will be required for the installation (and pre-installation) of the cable there is the possibility that invasive species may be introduced via biofouling or ballast water which are harmful to both sea and river lamprey. The introduction of non-native migratory fish species has the potential to increase competition for spawning grounds with domestic lamprey stocks and potentially reduce recruitment. In addition, the introduction of non-native parasites could also have negative effects on lamprey stocks. There is no publicly available literature on vessel born non-native species which are specifically harmful to lamprey. In addition, only a few parasites have been recorded from lampreys and nothing is known about their effect (Maitland, 2003). Although unlikely it is possible that non-native species may be introduced as a result of installation vessels operating in the near and offshore sections of the Proposed Development, however it is highly unlikely that any of these will be harmful to sea and river lamprey. It is concluded therefore that the potential introduction of non-native species will not lead to LSE River Avon SAC, River Axe SAC, Littoral Cauchois SAC, Estuaire de la Seine SAC/Marais Vernier Ramsar, Estuaires et Littoral Picards (Baies de Somme et d'Authie) SAC, Baie de Canche et Couloir des trois Estuaires SAC and Baie de Seine Orientale SAC.	N

SAC/ZSC/Ramsar	Effect	Assessment	Potential for LSE? Y/N
	Pollution Events	Pollution as a result of installation (operational and decommissioning) activities such as litter and contamination (hydrocarbons, Pesticides and PAHs), pesticides, anti-foulants, pharmaceuticals, transition elements and organo-metals) from installation vessels and release of liquids (bentonite) from HDD operations may have effects on lamprey (and transformers) whilst they are migrating to or from freshwater. As LSE cannot be fully ruled out this effect will be progressed to AA stage. Historic pollution in the form of contaminated sediments (i.e. transition elements and organo-metals) is not considered to have the potential to lead to LSE i.e. as a result of re-suspension, as the area is not highly contaminated.	Y
	Noise and vibration	The impact of noise and vibration may occur as a result of cable installation (and decommissioning) activities (cable laying and cable protection) and Landfall activities (HDD, vibro hammering/pile driving of four 36” steel casings and support lattices). Lamprey are considered to be hearing generalists, with a maximum hearing range of no more than several hundred Hz (Popper, 2005). Therefore, behavioural or physiological effects on lamprey are considered to only occur when the organism is very close to a powerful noise source (Popper, 2005; Popper and Hastings 2009). A powerful noise source could be produced by piling however no piling will be required for the Proposed Development with the loudest source of noise expected to be from mechanical trenching (123 dB re 1 µPa at a range of 160 m). Popper *et al.* (2014) recommended guidelines for shipping and other continuous noises, with cable laying, vibro piling and HDD considered to fall within this category. Fish with no swim bladder (particle motion detection), such as sea lamprey, were assigned a low risk to mortality, potential mortal injury and recoverable injury near to the source from continuous sound sources. Given that lamprey have a low sensitivity to noise and vibration they are at low risk from mortality and mortal injury as a result of trenching operations, HDD and vibropiling and it is concluded that this impact will not lead to LSE on the river Avon, river Axe, Littoral Cauchois, Estuaire de la Seine SAC/Marais Vernier Ramsar, Estuaires et Littoral Picards (Baies de Somme et d’Authie), Baie de Canche et Couloir des trois Estuaires and Baie de Seine Orientale SAC.	N

Table 7.7 - LSE Assessment for Sea lamprey and River lamprey during Operation (including Repair and Maintenance)

SAC/ZSC/Ramsar	Effect	Assessment	Potential for LSE? Y/N
Sea Lamprey: River Avon River Axe Littoral Cauchois Estuaire de la Seine SAC/Marais Vernier Ramsar Baie de Canche et Couloir des trois Estuaires Baie de Seine Orientale **River Lamprey:** Littoral Cauchois Estuaire de la Seine SAC/Marais Vernier Ramsar Estuaires et Littoral Picards (Baies de Somme et d'Authie) Baie de Canche et Couloir des trois Estuaires Baie de Seine Orientale	EMF	The potential impact of EMF could occur as a result of the operation of the Proposed Development. The predicted field strength for EMF around the cables is 42 µT at 1 m depth. As this is the minimum buried depth of the cables thus far proposed this is considered to be the worst case. The effects of EMF on lamprey is not well documented. Elasmobranches on the other hand are known to be electroreceptive due to the presence of Ampullae of Lorenzini which allow this group of fishes to detect very weak voltage gradients. Lamprey also possess ampullary organs on their heads and bodies. Brodznick *et al.* (1983) showed that these are sensitive to weak, low frequency electric fields. However, there is no evidence that lampreys respond to magnetic B fields and no responses to cable induced electric fields have been recorded. Lamprey utilise both the pelagic and benthic zones whilst at sea and coastally (and in estuaries) (Hardisty, 1986). It is therefore possible that on their spawning migration back to freshwater they will encounter low levels (42 µT at the seabed) of EMF from the Proposed Development. However, given that that there is no evidence that shows a behavioural response from these species to EMF from cables their migration is unlikely to be affected. It is concluded that EMF as a result of the Proposed Development will not lead to LSE on the River Avon, River Axe, Littoral Cauchois, Estuaire de la Seine SAC/Marais Vernier Ramsar, Estuaires et Littoral Picards (Baies de Somme et d'Authie), Baie de Canche et Couloir des trois Estuaires and Baie de Seine Orientale ZSC/SACs.	N
	Temperature changes	Heat is generated as electricity passes through cables as a result of the resistance of the conductor material. It is expected that during operation a small amount of heat will be produced by the Proposed Development. The effect of heat from subsea cables on lamprey is not well documented however a study undertaken for the Nemo link HVDC (Nemo Link, 2013) cable calculated that localised temperature increases in the seabed above the cable would only be 1.2°C at 0.3 m depth and 0.7°C at 0.1 m depth from the seabed surface. Information presented within the ES Addendum regarding potential heat emissions from the Marine Cables supports the findings from these studies (document reference 7.8.1). The cables for the Proposed Development will be buried to a target burial depth of 1 m, and the thermal assessment demonstrates that any substantial temperature increase will not be detectable at the seabed. In addition, lamprey are highly mobile and not dependent on the	N

SAC/ZSC/Ramsar	Effect	Assessment	Potential for LSE? Y/N
		seabed so interaction with any heat, from the Proposed Development is unlikely. Given the minimal emissions of heat from the Marine Cables which is expected to have little to no effect on lamprey this impact will not lead to LSE on the River Avon, River Axe, Littoral Cauchois, Estuaire de la Seine SAC/Marais Vernier Ramsar, Baie de Canche et Couloir des trois Estuaires, Baie de Seine Orientale and Estuaires et Littoral Picards (Baies de Somme et d'Authie) SACs.	

7.2.3. MARINE MAMMALS

7.2.3.1. This section considers the potential for LSE from the effects identified in Section 6 on the marine mammal species identified in Section 4. Information from the ES has been used to inform the LSE screening assessment which is presented in Table 7.8.

7.2.3.2. The seven pre-screened in European designated sites (i.e. those with which there is potential for connectivity) identified in Section 6 have been grouped and considered together for each species. The species have also been grouped and considered together for each effect because there is little difference in susceptibility between species.

7.2.3.3. As summarised in Table 7.8 below, it is concluded that there is no LSE for the Proposed Development alone for any of the marine mammal features for any of the SACs/Ramsars identified as part of this HRA from the following potential effects: auditory injury, disturbance, collision and indirect effects.

7.2.3.4. The potential for pollution events to have LSE cannot be ruled out therefore pollution has been taken through to the next stage of the assessment (see Section 10).

Table 7.8 - Assessment of LSE on Natura 2000/Ramsar marine mammal features resulting from the Proposed Development alone. This assessment relates to all phases of the project (i.e. construction, operation and decommissioning) unless otherwise stated

Effect	Species	Relevant SACs/ZSC/Ramsar	LSE?	Justification
Auditory injury	Bottlenose dolphin	Estuaires et littoral picards (baies de Somme et d'Authie) SAC Littoral Cauchois SAC Baie de Seine orientale SAC	N	Noise from use of geophysical survey and positioning equipment: The sound emitted by some geophysical survey and positioning equipment has the potential to induce the onset of permanent threshold shift ('PTS'), i.e. auditory injury, at very close range (i.e. within 1 m) if source levels are high (National Oceanic and Atmospheric Administration ('NOAA') (2018) PTS onset thresholds used; see Section 10.6.1 of Chapter 10 the ES for detail of the approach used). As animals are very unlikely to occur at very close range, i.e. within a few metres of the vessels carrying the equipment, it is considered that there is negligible potential for the sound emitted by geophysical survey and positioning equipment to induce the onset of PTS. Noise from seabed preparation work, cable installation activities and vessels: The M-weighted sound exposure level ('SEL') ranges out to which auditory injury (PTS onset) is predicted to occur for noise from the proposed seabed preparation work, cable installation activities and vessels are predicted to be less than one metre (Inchcape Offshore Limited ('ICOL'), 2013; Natural Power, 2018). There is therefore negligible potential for auditory injury as a result of increased noise from the proposed seabed preparation work, cable installation activities and vessels (see Section 10.3.2 of Chapter 10 of the ES for detail of the approach used). Noise from HDD work (construction phase only): Due to the very low levels of noise measured during HDD work (Nedwell *et al.*, 2012), there is considered to be negligible potential for auditory injury (PTS onset; see Section 10.3.2 of Chapter 10 of the ES for detail of the approach used). Noise from potential vibro-hammering and sheet piling at the HDD locations (construction phase only): Due to the low levels of noise emitted by typical EMV and pipe driving machines, the potential for auditory injury (PTS onset) is considered to be nil even at source (NOAA (2018) PTS onset thresholds used; see Section 10.6.1 of Chapter 10 of the ES for detail of the approach used). **Therefore, no LSE as a result of auditory injury is concluded for bottlenose dolphin, harbour porpoise, grey seal and harbour seal as a result of the Proposed Development alone.**
	Harbour porpoise	Récifs Gris-Nez Blanc-Nez SAC Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC Baie de Canche et couloir des trois estuaires SAC Estuaires et littoral picards (baies de Somme et d'Authie) SAC Littoral Cauchois SAC Baie de Seine orientale SAC Estuaire de la Seine SAC	N	
	Grey seal	Récifs Gris-Nez Blanc-Nez SAC Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC Baie de Canche et couloir des trois estuaires SAC Estuaires et littoral picards (baies de Somme et d'Authie) SAC/Baie de Somme Ramsar Littoral Cauchois SAC Baie de Seine orientale SAC Estuaire de la Seine SAC	N	
	Harbour seal	Récifs Gris-Nez Blanc-Nez SAC Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC Baie de Canche et couloir des trois estuaires SAC Estuaires et littoral picards (baies de Somme et d'Authie) SAC/Baie de Somme Ramsar Littoral Cauchois SAC Baie de Seine orientale SAC Estuaire de la Seine SAC	N	
Disturbance	Bottlenose dolphin	Estuaires et littoral picards (baies de Somme et d'Authie) SAC Littoral Cauchois SAC	N	Noise from use of geophysical survey and positioning equipment:

Effect	Species	Relevant SACs/ZSC/Ramsar	LSE?	Justification
		Baie de Seine orientale SAC		The sound emitted by some geophysical survey and positioning equipment has the potential to disturb marine mammals if the frequency/frequencies used fall within their hearing range. Although there is potential for disturbance of a very small number of individuals, any effects are predicted to be temporary and reversible (animals are likely to return to affected sites within a few hours as documented by Thompson *et al*., 2013) with suitable alternative local habitat being available in the meantime. Given the low abundance of marine mammals in the vicinity of the Proposed Development, there is considered to be negligible potential for significant disturbance. <u>Noise from seabed preparation work, cable installation activities and vessels</u>: Disturbance ranges as a result of increased anthropogenic noise from the activities and vessels proposed are likely to be small (<1 to 140 m; ICOL, 2013; Natural Power, 2018). There is therefore negligible potential for significant disturbance as a result of noise from the proposed work/activities and vessels. Furthermore, any effects are likely to be temporary and reversible with suitable alternative local habitat being available in the meantime. <u>Noise from HDD work (construction phase only)</u>: Due to the very low levels of noise measured during HDD work (Nedwell *et al*., 2012), there is considered to be negligible potential for disturbance. <u>Noise from potential vibro-hammering and sheet piling at the HDD locations (construction phase only)</u>: Due to the low levels of noise emitted by typical EMV and pipe driving machines, the potential for disturbance in response to underwater noise is considered to be negligible. <u>Presence of EMF (operational phase only)</u>: The potential effects of the presence of EMF include temporary behavioural responses. Any changes to swimming behaviour as a result of the presence of EMF are likely to be corrected within a few metres (i.e. be very small scale and temporary) and therefore have minimal effect (Normandeau *et al*., 2011). There is therefore negligible potential for significant disturbance as a result of the presence of EMF. <u>Disturbance of seals hauled out (construction phase only)</u>: The potential for disturbance of seals hauled out at locations within these seven sites in response to in air noise is nil due to the distance between the Proposed Development and the sites (53-104 km; see Table 6.5). **Therefore, no LSE as a result of disturbance is concluded for bottlenose dolphin, harbour porpoise, grey seal and harbour seal as a result of the Proposed Development alone.**
	Harbour porpoise	Récifs Gris-Nez Blanc-Nez SAC Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC Baie de Canche et couloir des trois estuaires SAC Estuaires et littoral picards (baies de Somme et d'Authie) SAC Littoral Cauchois SAC Baie de Seine orientale SAC Estuaire de la Seine SAC	N	
	Grey seal	Récifs Gris-Nez Blanc-Nez SAC Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC Baie de Canche et couloir des trois estuaires SAC Estuaires et littoral picards (baies de Somme et d'Authie) SAC/Baie de Somme Ramsar Littoral Cauchois SAC Baie de Seine orientale SAC Estuaire de la Seine SAC	N	
	Harbour seal	Récifs Gris-Nez Blanc-Nez SAC Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC Baie de Canche et couloir des trois estuaires SAC Estuaires et littoral picards (baies de Somme et d'Authie) SAC/Baie de Somme Ramsar Littoral Cauchois SAC Baie de Seine orientale SAC Estuaire de la Seine SAC	N	

Effect	Species	Relevant SACs/ZSC/Ramsar	LSE?	Justification
Collision	Bottlenose dolphin	Estuaires et littoral picards (baies de Somme et d'Authie) SAC Littoral Cauchois SAC Baie de Seine orientale SAC	N	Vessel strikes are a known cause of mortality and physical injury (with potential for subsequent infection) in marine mammals, particularly large whales. The species under consideration are considered to be more agile than the large whales and have been shown to avoid ships e.g. Palka and Hammond (2001). Due to the nature of the Proposed Development, the large vessels will be following a pre-defined linear route when working and the small to medium sized vessels will either be stationary, travelling at low to moderate working speeds or transiting in a predictable manner. Therefore, it will be easy for animals to predict their path and avoid them, which will greatly reduce the risk of collision. In addition, any animals present will already be habituated to the high levels of vessel movements present in the study area (which is *circa* 450 vessel movements/day in summer and 300 vessel movements/day in winter (see Chapter 13 Shipping, Navigation and Other Marine Users of the ES Volume 1, APP-128). Therefore, the potential for signficant effects resulting from collisions is considered to be negligible. **Therefore, no LSE as a result of collisions is concluded for bottlenose dolphin, harbour porpoise, grey seal and harbour seal as a result of the Proposed Development alone.**
	Harbour porpoise	Récifs Gris-Nez Blanc-Nez SAC Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC Baie de Canche et couloir des trois estuaires SAC Estuaires et littoral picards (baies de Somme et d'Authie) SAC Littoral Cauchois SAC Baie de Seine orientale SAC Estuaire de la Seine SAC	N	
	Grey seal	Récifs Gris-Nez Blanc-Nez SAC Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC Baie de Canche et couloir des trois estuaires SAC Estuaires et littoral picards (baies de Somme et d'Authie) SAC/Baie de Somme Ramsar Littoral Cauchois SAC Baie de Seine orientale SAC Estuaire de la Seine SAC	N	
	Harbour seal	Récifs Gris-Nez Blanc-Nez SAC Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC Baie de Canche et couloir des trois estuaires SAC Estuaires et littoral picards (baies de Somme et d'Authie) SAC/Baie de Somme Ramsar Littoral Cauchois SAC Baie de Seine orientale SAC Estuaire de la Seine SAC	N	
Indirect effects	Bottlenose dolphin	Estuaires et littoral picards (baies de Somme et d'Authie) SAC Littoral Cauchois SAC Baie de Seine orientale SAC	N	Indirect effects such as changes in suspended sediment levels as a result of construction (operation and decommissioning) including seabed preparation activities (such as dredging/MFE) have the potential to affect prey availability/quality and alter marine mammal foraging behaviour/success and therefore fitness. However, marine mammals are recorded foraging in areas where sediment suspension levels are high, such as estuaries, and may in fact target such areas for foraging (Bailey and Thompson, 2010). Because cetaceans do not rely on visual cues to hunt (they use echolocation) and seals are sensitive to hydrodynamic stimuli through their whiskers rather than relying solely on sight and sound (Dehnhardt *et al*., 1998; 2001), it is expected that marine mammals will continue to forage in areas of high sediment load, relying on sensory cues other than visual ones. It is also predicted that increases in SSC as a result of the Proposed Development will reduce down to background levels within a few days so any potential effects would only be short term and temporary.
	Harbour porpoise	Récifs Gris-Nez Blanc-Nez SAC Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC Baie de Canche et couloir des trois estuaires SAC Estuaires et littoral picards (baies de Somme et d'Authie) SAC Littoral Cauchois SAC Baie de Seine orientale SAC Estuaire de la Seine SAC	N	
	Grey seal	Récifs Gris-Nez Blanc-Nez SAC Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC Baie de Canche et couloir des trois estuaires SAC Estuaires et littoral picards (baies de Somme et d'Authie) SAC/Baie de Somme Ramsar Littoral Cauchois SAC Baie de Seine orientale SAC Estuaire de la Seine SAC	N	

Effect	Species	Relevant SACs/ZSC/Ramsar	LSE?	Justification
	Harbour seal	Récifs Gris-Nez Blanc-Nez SAC Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC Baie de Canche et couloir des trois estuaires SAC Estuaires et littoral picards (baies de Somme et d'Authie) SAC/Baie de Somme Ramsar Littoral Cauchois SAC Baie de Seine orientale SAC Estuaire de la Seine SAC	N	Furthermore, because marine mammals range widely and forage in a variety of habitats, any short-term local level changes in prey availability/quality are unlikely to result in a reduction in fitness or breeding success. **Therefore, no LSE as a result of indirect effects is concluded for bottlenose dolphin, harbour porpoise, grey seal and harbour seal as a result of the Proposed Development alone.**
Pollution	Bottlenose dolphin	Estuaires et littoral picards (baies de Somme et d'Authie) SAC Littoral Cauchois SAC Baie de Seine orientale SAC	Y	Potential pollution as a result of the Proposed Development may be split into two broad types: Contamination as a result of unplanned spills and the unplanned disposal of litter. Pollution may have short-term/direct effects on marine mammals if water quality is affected as a result of an unplanned spill (Lane *et al*., 2015), litter is ingested (Kastelein and Lavaleije, 1992) or animals become entangled in marine debris (Baulch and Perry, 2014). Pollution may also have long-term/indirect effects on marine mammals if contaminated prey items are ingested. Because marine mammals are long-lived apex predators, bioaccumulation as a result of ingestion of contaminated prey items may occur (Wells *et al*., 2005). This may lead to health issues such as reduced reproductive success. Historic pollution in the form of contaminated sediments (i.e. transition elements and organo-metals) is not considered to have the potential to lead i.e. through resuspension of sediments, to a LSE as the area is not considered to be highly contaminated. **The potential for pollution to result in a LSE on bottlenose dolphin, harbour porpoise, grey seal and harbour seal as a result of the Proposed Development alone cannot be ruled out and therefore pollution has been taken through to the next stage of the assessment (see Section 10).**
	Harbour porpoise	Récifs Gris-Nez Blanc-Nez SAC Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC Baie de Canche et couloir des trois estuaires SAC Estuaires et littoral picards (baies de Somme et d'Authie) SAC Littoral Cauchois SAC Baie de Seine orientale SAC Estuaire de la Seine SAC	Y	
	Grey seal	Récifs Gris-Nez Blanc-Nez SAC Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC Baie de Canche et couloir des trois estuaires SAC Estuaires et littoral picards (baies de Somme et d'Authie) SAC/Baie de Somme Ramsar Littoral Cauchois SAC Baie de Seine orientale SAC Estuaire de la Seine SAC	Y	
	Harbour seal	Récifs Gris-Nez Blanc-Nez SAC Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC Baie de Canche et couloir des trois estuaires SAC Estuaires et littoral picards (baies de Somme et d'Authie) SAC/Baie de Somme Ramsar Littoral Cauchois SAC Baie de Seine orientale SAC Estuaire de la Seine SAC	Y	

7.2.4. MARINE ORNITHOLOGY

7.2.4.1. An assessment of LSE on designated marine ornithological features during the construction, operation and decommissioning phases of the Proposed Development is provided in Table 7.9.

Table 7.9 - Assessment of LSE on designated marine ornithological features as a result of the Proposed Development across all phases of development

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
Solent and Dorset Coast SPA	Disturbance and displacement	Little tern	Y	Foraging little terns are considered to be of moderate sensitivity to disturbance from vessel traffic (Garthe & Hüppop, 2004; Bradbury *et al*., 2014). Due to the species' restricted foraging range (Parsons *et al*., 2015), the presence of vessels and associated activities during all phases of development may displace this feature from favoured foraging habitat within this SPA through both visual disturbance and unpredictable noise events, particularly in relation to HDD works during construction.
		Sandwich tern	N	Foraging Sandwich terns are considered to be of low sensitivity to disturbance from vessel traffic and associated activities (Garthe & Hüppop, 2004; Bradbury *et al*., 2014). Indeed, Sandwich terns are known to forage within the Solent where vessel traffic levels are already high (Wilson *et al*., 2014; Natural England, 2016; Natural England, 2019c). It is considered that the increase in traffic due to the Proposed Development is low when compared to the existing vessel activity in the area. It is therefore considered that Sandwich terns will habituate to the increased presence of vessels and associated activities during all phases of development and LSE can be ruled out.
		Common tern	N	Foraging common terns are considered to be of low sensitivity to disturbance from vessel traffic and associated activities (Garthe & Hüppop, 2004; Bradbury *et al*., 2014). Indeed, common terns are known to forage within the Solent where vessel traffic levels are already high (Wilson *et al*., 2014; Natural England, 2016; Natural England, 2019c). It is considered that the increase in traffic due to the Proposed Development is low when compared to the existing vessel activity in the area. It is therefore considered that as the increase in traffic resulting from the Proposed Development is low, common terns will habituate to the increased presence of vessels and associated activities during all phases of development and LSE can be ruled out..
		Supporting habitat (water column)	N	Disturbance and displacement of prey species present within the water column during all phases of development is considered to be negligible since it is likely that fish species present in the Solent are accustomed to vessel traffic and the presence of vessels towing equipment (e.g. commercial fishing vessels) and will simply navigate round or under any construction or maintenance vessels. Any effects resulting from possible increases in suspended sediment are considered to be of limited spatial extent and short lived (reduce to background levels within days) and LSE can be ruled out..
	Indirect effects	Little tern	Y	Little terns are visual foragers (Parsons *et al*., 2015) and are likely to be affected by an increase in turbidity which can make it harder to see prey from the sea surface. They are considered to be moderately sensitive to habitat disturbance and subsequent potential effects on prey species (Bradbury *et al*., 2014). Increases in suspended sediment as a result of seabed preparation, HDD works, cable burial activities and cable maintenance within this SPA may affect prey availability within this species' restricted foraging range.
		Sandwich tern	Y	Sandwich terns are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey from the sea surface. They are considered to be moderately sensitive to habitat disturbance and therefore to potential effects on prey species (Bradbury *et al*., 2014).

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
				Increases in suspended sediment as a result of seabed preparation, HDD works, cable burial activities and cable maintenance within this SPA may affect prey availability within this species' foraging range (Wilson *et al*., 2014).
		Common tern	Y	Common terns are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey from the sea surface. They are considered to be moderately sensitive to habitat disturbance and therefore to potential effects on prey species (Bradbury *et al*., 2014). Increases in suspended sediment as a result of seabed preparation, HDD works, cable burial activities and cable maintenance within this SPA may affect prey availability within this species' foraging range (Wilson *et al*., 2014).
		Supporting habitat (water column)	Y	Increases in suspended sediment as a result of seabed preparation, HDD works, cable burial activities and cable maintenance may increase turbidity of this supporting habitat, altering prey availability though changes in primary production by phytoplankton, as well as making it harder for visual foraging features to see prey from the sea surface.
	Collision	Little tern	N	Structures or devices which have the potential to pose an above water collision risk to little terns will not be introduced during any development phase. Surface feeding species including terns are not considered to be vulnerable to below water collisions (Furness *et al*., 2012) and LSE can be ruled out.
		Sandwich tern	N	Structures or devices which have the potential to pose an above water collision risk to Sandwich terns will not be introduced during any development phase. Surface feeding species including terns are not considered to be vulnerable to below water collisions (Furness *et al*., 2012) and LSE can be ruled out.
		Common tern	N	Structures or devices which have the potential to pose an above water collision risk to common terns will not be introduced during any development phase. Surface feeding species including terns are not considered to be vulnerable to below water collisions (Furness *et al*., 2012) and LSE can be ruled out.
	INIS	Little tern	N	There is no pathway for activities associated with the Proposed Development to introduce invasive non-indigenous predators (e.g. mink) to little tern breeding colonies, since vessels will not be berthed in Chichester and Langstone Harbours.
		Sandwich tern	N	There is no pathway for activities associated with the Proposed Development to introduce invasive non-indigenous predators (e.g. mink) to Sandwich tern breeding colonies, since installation vessels will not be berthed in Chichester and Langstone Harbours.
		Common tern	N	There is no pathway for activities associated with the Proposed Development to introduce invasive non-indigenous predators (e.g. mink) to common tern breeding colonies, since installation vessels will not be berthed in Chichester and Langstone Harbours.
		Supporting habitat (water column)	N	Invasive species (e.g. Chinese mitten crabs, slipper limpets and Pacific oyster) may be introduced into the water column via biofouling or ballast water from vessels. Invasive species can affect habitat structure and those with versatile diets can cause detrimental impacts by outcompeting natives and therefore altering the community structure and food chain (Orlova *et al*., 2006). However, given that all three tern species predate on a range of prey species including sandeels,

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
				herring and sprats which are highly mobile, these species will not be affected by localised changes in prey communities and LSE can be ruled out.
	Accidental spills	Little tern	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect little terns when in contact with the sea surface through direct oiling resulting in mortality.
		Sandwich tern	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect Sandwich terns when in contact with the sea surface through direct oiling resulting in mortality.
		Common tern	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect common terns when in contact with the sea surface through direct oiling resulting in mortality.
		Supporting habitat (water column)	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Oil can cause sublethal impacts on juvenile fish growth and survival, thus potentially affecting prey availability.
	Litter	Little tern	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect little terns when utilising the sea surface through ingestion or entanglement resulting in mortality.
		Sandwich tern	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect Sandwich terns when utilising the sea surface through ingestion or entanglement resulting in mortality.
		Common tern	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect common terns when utilising the sea surface through ingestion or entanglement resulting in mortality.
		Supporting habitat (water column)	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect prey species within the water column through ingestion or entanglement resulting in mortality.
Chichester and Langstone Harbours SPA/Ramsar site	Disturbance and displacement	Red-breasted merganser	Y	Red-breasted merganser feed and roost on the water in both Chichester and Langstone Harbours between October and March (Natural England, 2019a). This feature is considered to be of moderate sensitivity to disturbance (Bradbury *et al*., 2014; Gittings & O'Donoghue, 2016). As such, both visual disturbance and unpredictable noise events, particularly in relation to HDD works during construction in Langstone Harbour could result in disturbance of the feature and possible temporary displacement.
		Little tern	Y	Foraging little terns are considered to be of moderate sensitivity to disturbance from vessel traffic (Garthe & Hüppop, 2004; Bradbury *et al*., 2014). Due to the species' restricted foraging range (Parsons *et al*., 2015), the increased presence of vessels and associated activities during all phases of development may displace this feature from favoured foraging habitat within this SPA

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
				through both visual disturbance and unpredictable noise events, particularly in relation to HDD works during construction.
		Sandwich tern	N	Foraging Sandwich terns are considered to be of low sensitivity to disturbance from vessel traffic and associated activities (Garthe & Hüppop, 2004; Bradbury *et al*., 2014). Indeed, Sandwich terns are known to forage within Chichester and Langstone Harbours (Wilson *et al*., 2014; Natural England, 2016; Natural England, 2019a). It is therefore considered that Sandwich terns will habituate to the increased presence of vessels and associated activities during all phases of development and LSE can be ruled out.
		Common tern	N	Foraging common terns are considered to be of low sensitivity to disturbance from vessel traffic and associated activities (Garthe & Hüppop, 2004; Bradbury *et al*., 2014). Indeed, common terns are known to forage within Chichester and Langstone Harbours (Wilson *et al*., 2014; Natural England, 2016; Natural England, 2019a). It is therefore considered that common terns will habituate to the increased presence of vessels and associated activities during all phases of development and LSE can be ruled out.
		Supporting habitat (water column)	N	Disturbance and displacement of prey species present within the water column during all phases of development is considered to be negligible since it is likely that fish species present in the Solent are accustomed to vessel traffic and the presence of vessels towing equipment (e.g. commercial fishing vessels) and will simply navigate round or under any construction or maintenance vessels and LSE can be ruled out.
	Indirect effects	Red-breasted merganser	Y	Red-breasted mergansers are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey in the water column. They are considered to be moderately sensitive to habitat disturbance and subsequent potential effects on prey (Bradbury *et al*., 2014). Increases in suspended sediment as a result of seabed preparation, HDD works, cable burial activities and cable maintenance may affect prey availability within favoured foraging areas within Langstone and Chichester Harbours.
		Little tern	Y	Little terns are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey from the sea surface. They are considered to be moderately sensitive to habitat disturbance and therefore potential effects on prey (Bradbury *et al*., 2014). Increases in suspended sediment within Langstone Harbour as a result of seabed preparation, HDD works, in addition to cable burial and maintenance activities outwith Langstone Harbour, may affect prey availability within this species' restricted foraging range (Parsons *et al*., 2015).
		Sandwich tern	Y	Sandwich terns are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey from the sea surface. They are considered to be moderately sensitive to habitat disturbance and therefore potential effects on prey (Bradbury *et al*., 2014). Increases in suspended sediment within Langstone Harbour as a result of seabed preparation, HDD works, in addition to cable burial and maintenance activities outwith Langstone Harbour, may affect prey availability within this species' foraging range (Wilson *et al*., 2014).
		Common tern	Y	Common terns are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey from the sea surface. They are considered to be moderately

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
				sensitive to habitat disturbance and therefore potential effects on prey (Bradbury *et al*., 2014). Increases in suspended sediment within Langstone Harbour as a result of seabed preparation, HDD works, in addition to cable burial and maintenance activities outwith Langstone Harbour, may affect prey availability within this species' foraging range (Wilson *et al*., 2014).
		Supporting habitat (water column)	Y	Increases in suspended sediment as a result of seabed preparation, HDD works, cable burial activities and cable maintenance may increase turbidity of this supporting habitat, altering prey availability though changes in primary production by phytoplankton, as well as making it harder for visual foraging features to see prey from the sea surface.
	Collision	Red-breasted merganser	N	Structures or devices which have the potential to pose an above water collision risk to this feature will not be introduced during any development phase. Based on Furness *et al*., (2012), it is likely that red-breasted mergansers are moderately sensitive to below water collisions. Structures or devices within the water column associated with the Proposed Development will only be used in close proximity to an operating vessel. It is considered that red-breasted mergansers will avoid vessel operations and therefore LSE can be ruled out.
		Little tern	N	Structures or devices which have the potential to pose an above water collision risk to little terns will not be introduced during any phase of development. Surface feeding species including terns are not considered to be vulnerable to below water collisions (Furness *et al*., 2012).
		Sandwich tern	N	Structures or devices which have the potential to pose an above water collision risk to Sandwich terns will not be introduced during any phase of development. Surface feeding species including terns are not considered to be vulnerable to below water collisions (Furness *et al*., 2012).
		Common tern	N	Structures or devices which have the potential to pose an above water collision risk to common terns will not be introduced during any development phase. Surface feeding species including terns are not considered to be vulnerable to below water collisions (Furness *et al*., 2012).
	INIS	Little tern	N	There is no pathway for offshore construction work activities associated with the Proposed Development to introduce invasive non-indigenous predators (e.g. mink) to little tern breeding colonies, since vessels will not be berthed in Chichester and Langstone Harbours.
		Sandwich tern	N	There is no pathway for offshore construction work activities associated with the Proposed Development to introduce invasive non-indigenous predators (e.g. mink) to Sandwich tern breeding colonies, since vessels will not be berthed in Chichester and Langstone Harbours.
		Common tern	N	There is no pathway for offshore construction work activities associated with the Proposed Development to introduce invasive non-indigenous predators (e.g. mink) to common tern breeding colonies since vessels will not be berthed in Chichester and Langstone Harbours.
		Supporting habitat (water column)	N	Invasive species (e.g. Chinese mitten crabs, slipper limpets and Pacific oyster) may be introduced into the water column via biofouling or ballast water from vessels. Invasive species can affect habitat structure and those with versatile diets can cause detrimental impacts by outcompeting natives and therefore altering the community structure and food chain (Orlova *et al*., 2006). However, given that all three tern species predate on a range of prey species including sandeels,

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
				herring and sprats which are highly mobile, species will not be affected by localised changes in prey communities and LSE can be ruled out.
	Accidental spills	Red-breasted merganser	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect red-breasted mergansers utilising the sea surface through direct oiling resulting in mortality.
		Little tern	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect little terns when in contact with the sea surface through direct oiling resulting in mortality.
		Sandwich tern	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect Sandwich terns when in contact with the sea surface through direct oiling resulting in mortality.
		Common tern	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect common terns when in contact with the sea surface through direct oiling resulting in mortality.
		Supporting habitat (water column)	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Oil can cause sublethal impacts on juvenile fish growth and survival, thus potentially affecting prey availability.
	Litter	Red-breasted merganser	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect red-breasted mergansers when utilising the sea surface through ingestion or entanglement resulting in mortality.
		Little tern	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect little terns when utilising the sea surface through ingestion or entanglement resulting in mortality.
		Sandwich tern	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect Sandwich terns when utilising the sea surface through ingestion or entanglement resulting in mortality.
		Common tern	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect common terns when utilising the sea surface through ingestion or entanglement resulting in mortality.
		Supporting habitat (water column)	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect prey species within the water column through ingestion or entanglement resulting in mortality.
Portsmouth Harbour SPA/Ramsar site	Disturbance and displacement	Red-breasted merganser	N	Red-breasted merganser feed and roost on the water in Portsmouth Harbour between November and April (Natural England, 2019b). This feature is considered to be of moderate sensitivity to disturbance (Bradbury *et al*., 2014; Gittings & O'Donoghue, 2016). The distance between the Proposed Development (including a rolling safe passage distance of 700 m for associated vessel activities) and favoured foraging and roosting areas in Portsmouth Harbour (coastal distance of >5

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
				km) is considered to be such as to ensure no significant disturbance or displacement of red-breasted mergansers utilising this SPA (e.g. Schwemmer *et al*., 2011) and LSE can be ruled out.
		Supporting habitat (water column)	N	Disturbance and displacement of prey species present within the water column during all phases of development is considered to be negligible since it is likely that fish species present in the Solent are accustomed to vessel traffic and the presence of vessels towing equipment (e.g. commercial fishing vessels) and will simply navigate round or under any construction or maintenance vessels and LSE can be ruled out.
	Indirect effects	Red-breasted merganser	N	Red-breasted mergansers are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey in the water column. They are considered to be moderately sensitive to habitat disturbance and to subsequent potential effects on prey species (Bradbury *et al*., 2014). Increases in suspended sediment as a result of seabed preparation, HDD works, cable burial activities and cable maintenance are expected to be highly localised and to return to within comparable background concentrations within days. Given the distance between the Proposed Development and favoured foraging and roosting grounds in Portsmouth Harbour (coastal distance of >5 km), it is considered that there is no potential for impact during any development phase and LSE can be ruled out.
		Supporting habitat (water column)	N	Increases in suspended sediment as a result of seabed preparation, HDD works, cable burial activities and cable maintenance are expected to be highly localised and unlikely to alter prey availability in the water column at Portsmouth Harbour due to distance and LSE can be ruled out.
	Collision	Red-breasted merganser	N	Structures or devices which have the potential to pose an above water collision risk to this feature will not be introduced during any development phase. Based on Furness *et al*., (2012), it is likely that red-breasted mergansers are moderately sensitive to below water collisions. Structures or devices within the water column associated with the Proposed Development will only be used in close proximity to an operating vessel. It is considered that red-breasted mergansers will avoid vessel operations and therefore the risk of below water collision is negligible and LSE can be ruled out.
	INIS	Supporting habitat (water column)	N	Invasive species (e.g. Chinese mitten crabs, slipper limpets and Pacific oyster) may be introduced into the water column via biofouling or ballast water from vessels. Invasive species can affect habitat structure and those with versatile diets can cause detrimental impacts by outcompeting natives and therefore altering the community structure and food chain (Orlova *et al.,* 2006). However, given that all three tern species predate on a range of prey species including sandeels, herring and sprats which are highly mobile, species will not be affected by localised changes in prey communities and LSE can be ruled out.
	Accidental spills	Red-breasted merganser	Y	Unplanned oil or chemical spillages from vessels may occur during any development phase. Spills have the potential to directly affect red-breasted mergansers when in contact with the sea surface through direct oiling resulting in mortality.
		Supporting habitat (water column)	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Oil can cause sublethal impacts on juvenile fish growth and survival, thus potentially affecting prey availability.

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
	Litter	Red-breasted merganser	Y	Unplanned disposal of industrial or user plastic during any development phase has the potential to directly affect red-breasted mergansers when utilising the sea surface through ingestion or entanglement resulting in mortality.
		Supporting habitat (water column)	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect prey species within the water column through ingestion or entanglement resulting in mortality.
Solent and Southampton Water SPA/Ramsar site	Disturbance and displacement	Little tern	N	Important breeding areas within this SPA include Hurst Point-Pitts Deep, with less frequently used sites including North Solent, Lymington to Pylewell, and Newtown Harbour (Natural England, 2019c). Important foraging areas within this SPA include Hurst Point-Pitts Deep, and the Medina Estuary off the Isle of Wight. Given that these areas are located >15 km from the Proposed Development, it is considered that there is no potential for impact during any development phase based on the species' restricted foraging range (Parsons *et al*., 2015) and LSE can be ruled out.
		Common tern	N	Foraging common terns are considered to be of low sensitivity to disturbance from vessel traffic and associated activities (Garthe & Hüppop, 2004; Bradbury *et al*., 2014). Indeed, common terns are known to forage within the Solent where vessel traffic levels are already high (Wilson *et al*., 2014; Natural England, 2016; Natural England, 2019c). It is therefore considered that common terns will habituate to the increased presence of vessels and associated activities during all phases of development and LSE can be ruled out.
		Sandwich tern	N	Foraging Sandwich terns are considered to be of low sensitivity to disturbance from vessel traffic and associated activities (Garthe & Hüppop, 2004; Bradbury *et al*., 2014). Indeed, Sandwich terns are known to forage within the Solent where vessel traffic levels are already high (Wilson *et al*., 2014; Natural England, 2016; Natural England, 2019c). It is therefore considered that Sandwich terns will habituate to the increased presence of vessels and associated activities during all phases of development and LSE can be ruled out.
		Roseate tern	N	This feature no longer breeds in this SPA (Piec, 2018), with only a single individual recorded in Southampton Water during the last five years (last recorded in 2011; Frost *et al*., 2018). Whilst nesting habitat creation is currently being undertaken for this species in the Western Solent (Lymington-Keyhaven), it is considered that there is no potential for impact on this feature due to the distance between this potential breeding site and the Proposed Development (*c*.30 km) and the species' foraging range (16.6 ± 11.6 km; Thaxter *et al*., 2012) and LSE can be ruled out.
		Mediterranean gull	N	Important breeding areas within the SPA include Newtown Harbour, Hurst Castle to Lymington River Estuary, and the North Solent (Natural England, 2019c), all located >20 km from the Landfall at Eastney. Gull species are consistently scored as being amongst the least sensitive species to disturbance from vessel traffic (Garthe & Hüppop, 2004; Bradbury *et al*., 2014). Indeed, Mediterranean gulls forage in a variety of habitats where anthropogenic activities occur (Natural England, 2016; Natural England, 2019c). It is therefore considered that this feature will habituate to the increased presence of vessels and associated activities during all phases of development and LSE can be ruled out.

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
		Supporting habitat (water column)	N	Disturbance and displacement of prey species present within the water column during all phases of development is considered to be negligible since it is likely that fish species present in the Solent are accustomed to vessel traffic and the presence of vessels towing equipment (e.g. commercial fishing vessels) and will simply navigate round or under any construction or maintenance vessels and LSE can be ruled out.
	Indirect effects	Little tern	N	Important breeding areas within this SPA include Hurst Point-Pitts Deep, with less frequently used sites including North Solent, Lymington to Pylewell, and Newtown Harbour (Natural England, 2019c). Important foraging areas within this SPA include Hurst Point-Pitts Deep, and the Medina Estuary off the Isle of Wight. Given that these areas are located >15 km from the Proposed Development, it is considered that there is no potential for impact based on the species' restricted foraging range (Parsons *et al*., 2015) and LSE can be ruled out.
		Common tern	N	Common terns are visual foragers (Wilson *et al*., 2014) and are likely to be affected by an increase in turbidity which can make it harder to see prey from the sea surface. They are considered to be moderately sensitive to habitat disturbance and subsequent potential effects on prey species (Bradbury *et al*., 2014). However, any impact from suspended sediment release across all development phases is considered to be highly localised relative to the species' foraging range (Thaxter *et al*., 2012; Wilson *et al*., 2014), with equivalent foraging habitat elsewhere in the immediate vicinity of the Proposed Development and LSE can be ruled out.
		Sandwich tern	N	Sandwich terns are visual foragers (Wilson *et al*., 2014) and are likely to be affected by an increase in turbidity which can make it harder to see prey from the sea surface. They are considered to be moderately sensitive to habitat disturbance and therefore to potential effects on prey species (Bradbury *et al*., 2014). However, any impact from suspended sediment release across all development phases is considered to be highly localised relative to the species' foraging range (Thaxter *et al*., 2012; Wilson *et al*., 2014), with equivalent foraging habitat elsewhere in the immediate vicinity of the Proposed Development and LSE can be ruled out.
		Roseate tern	N	This feature no longer breeds in this SPA (Piec, 2018), with only a single individual recorded in Southampton Water during the last five years (last recorded in 2011; Frost *et al*., 2018). Whilst nesting habitat creation is currently being undertaken for this species in the Western Solent (Lymington-Keyhaven), it is considered that there is no potential for impact on this feature due to the distance between this potential breeding site and the Proposed Development (*c*.30 km) and the species' foraging range (16.6 ± 11.6 km; Thaxter *et al*., 2012) and LSE can be ruled out.
		Mediterranean gull	N	Mediterranean gulls are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey. Activities associated with all phases of the Proposed Development have the potential to release sediment during seabed preparation, cable burial, repair and maintenance works. The area covered by suspended material is considered to be of limited spatial extent and will return back to baseline concentrations within days. Given the plasticity shown by Mediterranean gulls in their foraging behaviour (taking a wide variety of prey items in both terrestrial and coastal environments; Natural England, 2019c), and that alternative feeding habitat is available elsewhere in the vicinity of the Proposed Development there is no potential for impact and LSE can be ruled out.

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
		Supporting habitat (water column)	N	Increases in suspended sediment as a result of seabed preparation, HDD works, cable burial activities and cable maintenance are expected to be highly localised and unlikely to alter prey availability in the water column at Portsmouth Harbour due to distance and LSE can be ruled out.
	Collision	Little tern	N	Structures or devices which have the potential to pose an above water collision risk to little terns will not be introduced during any development phase. Surface feeding species including terns are not considered to be vulnerable to below water collisions (Furness *et al*., 2012).
		Common tern	N	Structures or devices which have the potential to pose an above water collision risk to common terns will not be introduced during any development phase. Surface feeding species including terns are not considered to be vulnerable to below water collisions (Furness *et al*., 2012).
		Sandwich tern	N	Structures or devices which have the potential to pose an above water collision risk to Sandwich terns will not be introduced during any development phase. Surface feeding species including terns are not considered to be vulnerable to below water collisions (Furness *et al*., 2012).
		Roseate tern	N	This feature no longer breeds in this SPA (Piec, 2018), with only a single individual recorded in Southampton Water during the last five years (last recorded in 2011; Frost *et al*., 2018). Structures or devices which have the potential to pose an above water collision risk to roseate terns will not be introduced during any development phase. Surface feeding species including terns are not considered to be vulnerable to below water collisions (Furness *et al*., 2012).
		Mediterranean gull	N	Structures or devices which have the potential to pose an above water collision risk to Mediterranean gulls will not be introduced during any development phase. Surface feeding species including gulls are not considered to be vulnerable to below water collisions (Furness *et al*., 2012).
	INIS	Little tern	N	There is no pathway for offshore works associated with the Proposed Development to introduce invasive non-indigenous predators (e.g. mink) to the mainland little tern breeding colonies within the Solent and Southampton Waters SPA due to distance.
		Common tern	N	There is no pathway for offshore works associated with the Proposed Development to introduce invasive non-indigenous predators (e.g. mink) to the mainland common tern breeding colonies within the Solent and Southampton Waters SPA due to distance.
		Sandwich tern	N	There is no pathway for offshore works associated with the Proposed Development to introduce invasive non-indigenous predators (e.g. mink) to the mainland Sandwich tern breeding colonies within the Solent and Southampton Waters SPA due to distance.
		Roseate tern	N	There is no pathway for offshore works associated with the Proposed Development to introduce invasive non-indigenous predators (e.g. mink) to newly created and traditional mainland roseate tern breeding colonies within the Solent and Southampton Waters SPA due to distance.
		Mediterranean gull	N	There is no pathway for offshore works associated with the Proposed Development to introduce invasive non-indigenous predators (e.g. mink) to the mainland Mediterranean gull breeding colonies within the Solent and Southampton Waters SPA due to distance.

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
		Supporting habitat (water column)	N	Invasive species (e.g. Chinese mitten crabs, slipper limpets and Pacific oyster) may be introduced into the water column via biofouling or ballast water from vessels. Invasive species can affect habitat structure and those with versatile diets can cause detrimental impacts by outcompeting natives and therefore altering the community structure and food chain (Orlova *et al.*, 2006). However, given that all three tern species predate on a range of prey species including sandeels, herring and sprats which are highly mobile, these species will not be affected by localised changes in prey communities and LSE can be ruled out.
	Accidental spills	Little tern	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect little terns when in contact with the sea surface through direct oiling resulting in mortality.
		Common tern	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect common terns when in contact with the sea surface through direct oiling resulting in mortality.
		Sandwich tern	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect Sandwich terns when in contact with the sea surface through direct oiling resulting in mortality.
		Roseate tern	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect roseate terns when in contact with the sea surface through direct oiling resulting in mortality.
		Mediterranean gull	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect Mediterranean gulls when in contact with the sea surface through direct oiling resulting in mortality.
		Supporting habitat (water column)	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Oil can cause sublethal impacts on juvenile fish growth and survival, thus potentially affecting prey availability.
	Litter	Little tern	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect little terns when utilising the sea surface through ingestion or entanglement resulting in mortality.
		Common tern	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect common terns when utilising the sea surface through ingestion or entanglement resulting in mortality.
		Sandwich tern	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect Sandwich terns when utilising the sea surface through ingestion or entanglement resulting in mortality.
		Roseate tern	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect roseate terns when utilising the sea surface through ingestion or entanglement resulting in mortality.

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
		Mediterranean gull	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect Mediterranean gulls when utilising the sea surface through ingestion or entanglement resulting in mortality.
		Supporting habitat (water column)	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect prey species within the water column through ingestion or entanglement resulting in mortality.
Pagham Harbour SPA/Ramsar site	Disturbance and displacement	Common tern	N	Foraging common terns are considered to be of low sensitivity to disturbance from vessel traffic and associated activities (Garthe & Hüppop, 2004; Bradbury *et al*., 2014). Indeed, common terns are known to forage within Pagham Harbour and the wider Solent where vessel traffic levels are already high (Wilson *et al*., 2014; Natural England, 2016; Natural England, 2019d). It is therefore considered that common tern will habituate to the increased presence of vessels and associated activities during all phases of development and LSE can be ruled out.
		Supporting habitat (water column)	N	Disturbance and displacement of prey species present within the water column during all phases of development is considered to be negligible since it is likely that fish species present in the Solent are accustomed to vessel traffic and the presence of vessels towing equipment (e.g. commercial fishing vessels) and will simply navigate round or under any construction or maintenance vessels and LSE can be ruled out.
	Indirect effects	Common tern	N	Common terns are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey from the sea surface. They are considered to be moderately sensitive to habitat disturbance and therefore to potential effects on prey species (Bradbury *et al*., 2014). However, any impact is considered to be highly localised relative to the species' foraging range across all development phases, with equivalent foraging habitat elsewhere in the immediate vicinity of the Proposed Development and LSE can be ruled out.
		Supporting habitat (water column)	N	Increases in suspended sediment as a result of seabed preparation, HDD works, cable burial activities and cable maintenance are expected to be highly localised and unlikely to alter prey availability in the water column at Portsmouth Harbour due to distance and LSE can be ruled out.
	Collision	Common tern	N	Structures or devices which have the potential to pose an above water collision risk to common terns will not be introduced during any development phase. Surface feeding species including terns are not considered to be vulnerable to below water collisions (Furness *et al*., 2012).
	INIS	Common tern	N	There is no pathway for offshore works associated with the Proposed Development to introduce invasive non-indigenous predators (e.g. mink) to the mainland common tern breeding colony within Pagham Harbour SPA due to distance.
		Supporting habitat (water column)	N	Invasive species (e.g. Chinese mitten crabs, slipper limpets and Pacific oyster) may be introduced into the water column via biofouling or ballast water from vessels. Invasive species can affect habitat structure and those with versatile diets can cause detrimental impacts by outcompeting natives and therefore altering the community structure and food chain (Orlova *et al.,* 2006). However, given that all three tern species predate on a range of prey species including sandeels, herring and sprats which are highly mobile, species will not be affected by localised changes in prey communities and LSE can be ruled out.

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
	Accidental spills	Common tern	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect common terns when in contact with the sea surface through direct oiling resulting in mortality.
		Supporting habitat (water column)	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Oil can cause sublethal impacts on juvenile fish growth and survival, thus potentially affecting prey availability.
	Litter	Common tern	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect common terns when utilising the sea surface through ingestion or entanglement resulting in mortality.
		Supporting habitat (water column)	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect prey species within the water column through ingestion or entanglement resulting in mortality.
Littoral Seino-Marin SPA	Disturbance and displacement	Fulmar	N	Given their wide-ranging foraging behaviour (Thaxter *et al*., 2012), low sensitivity to disturbance from vessel traffic and associated activities (Garthe & Hüppop, 2004; Bradbury *et al*., 2014), and the distance between the SPA and the Proposed Development, there is no potential for impact on fulmar and LSE can be ruled out.
		Kittiwake	N	Given their wide-ranging foraging behaviour (Thaxter *et al*., 2012), low sensitivity to disturbance from vessel traffic and associated activities (Garthe & Hüppop, 2004; Bradbury *et al*., 2014), and the distance between the SPA and the Proposed Development, there is no potential for impact on kittiwake and LSE can be ruled out.
		Herring gull	N	Given their wide-ranging foraging behaviour (Thaxter *et al*., 2012), low sensitivity to disturbance from vessel traffic and associated activities (Garthe & Hüppop, 2004; Bradbury *et al*., 2014), and the distance between the SPA and the Proposed Development, there is no potential for impact on herring gull and LSE can be ruled out.
		Great black-backed gull	N	Given their wide-ranging foraging behaviour (Thaxter *et al*., 2012), low sensitivity to disturbance from vessel traffic and associated activities (Garthe & Hüppop, 2004; Bradbury *et al*., 2014), and the distance between the SPA and the Proposed Development, there is no potential for impact on great black-backed gull and LSE can be ruled out.
	Indirect effects	Fulmar	N	Given their wide-ranging, pelagic and opportunistic foraging behaviour (Thaxter *et al*., 2012), as well as their plasticity in diet (e.g. Phillips *et al*., 1999), the short-term, temporary and localised effects of sediment release on benthic prey availability there is no potential for impact on fulmar and LSE can be ruled out.
		Kittiwake	N	Given their wide-ranging, pelagic foraging behaviour (Thaxter *et al*; 2012; Ponchon *et al*., 2015), low sensitivity to vessel traffic (Garthe & Hüppop, 2004; Bradbury *et al*., 2014), and reliance on highly mobile shoaling fish (Natural England, 2012b), the short-term, temporary and localised effect of sediment release on benthic prey availability there is no potential for impact to kittiwake and LSE can be ruled out.

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
		Herring gull	N	Herring gulls utilise terrestrial, intertidal and marine habitats for foraging, taking a wide variety of prey species including invertebrates, small fish and carrion (including fishery discards). Given the plasticity shown by herring gulls in their foraging behaviour (Natural England, 2019d), the short-term, temporary and localised effect of sediment release on benthic prey availability there is no potential for impact to this feature and LSE can be ruled out.
		Great black-backed gull	N	Given their wide-ranging, pelagic foraging behaviour (Thaxter *et al*; 2012), low sensitivity to vessel traffic (Garthe & Hüppop, 2004; Bradbury *et al*., 2014), and plasticity in diet (JNCC, 2016a), the short-term, temporary and localised effect of sediment release on benthic prey availability there is no potential for impact to this feature and LSE can be ruled out.
	Collision	Fulmar	N	Structures or devices which have the potential to pose an above water collision risk to fulmars will not be introduced during any development phase. Surface feeding species including fulmars are not considered to be vulnerable to below water collisions (Furness *et al*., 2012).
		Kittiwake	N	Structures or devices which have the potential to pose an above water collision risk to kittiwake will not be introduced during any development phase. Surface feeding species including kittiwakes are not considered to be vulnerable to below water collisions (Furness *et al*., 2012).
		Herring gull	N	Structures or devices which have the potential to pose an above water collision risk to herring gulls will not be introduced during any development phase. Surface feeding species including gulls are not considered to be vulnerable to below water collisions (Furness *et al*., 2012).
		Great black-backed gull	N	Structures or devices which have the potential to pose an above water collision risk to great black-backed gulls will not be introduced during any development phase. Surface feeding species including gulls are not considered to be vulnerable to below water collisions (Furness *et al*., 2012).
	INIS	Fulmar	N	There is no pathway for marine works associated with the Proposed Development to introduce invasive non-indigenous predators (e.g. mink) to the mainland fulmar breeding colony within the Littoral Seino-Marin SPA due to distance.
		Kittiwake	N	There is no pathway for marine works associated with the Proposed Development to introduce invasive non-indigenous predators (e.g. mink) to the mainland kittiwake breeding colony within the Littoral Seino-Marin SPA due to distance.
		Herring gull	N	There is no pathway for marine works associated with the Proposed Development to introduce invasive non-indigenous predators (e.g. mink) to the mainland herring gull breeding colony within the Littoral Seino-Marin SPA due to distance.
		Great black-backed gull	N	There is no pathway for marine works associated with the Proposed Development to introduce invasive non-indigenous predators (e.g. mink) to the mainland great black-backed gull breeding colony within the Littoral Seino-Marin SPA due to distance.
	Accidental spills	Fulmar	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect fulmars when in contact with the sea surface through direct oiling resulting in mortality.

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
		Kittiwake	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect kittiwakes when in contact with the sea surface through direct oiling resulting in mortality.
		Herring gull	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect herring gulls when in contact with the sea surface through direct oiling resulting in mortality.
		Great black-backed gull	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect great black-backed gulls when in contact with the sea surface through direct oiling resulting in mortality.
	Litter	Fulmar	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect fulmars when utilising the sea surface through ingestion or entanglement resulting in mortality.
		Kittiwake	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect kittiwakes when utilising the sea surface through ingestion or entanglement resulting in mortality.
		Herring gull	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect herring gulls when utilising the sea surface through ingestion or entanglement resulting in mortality.
		Great black-backed gull	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect great black-backed gulls when utilising the sea surface through ingestion or entanglement resulting in mortality.
Alderney West and Burhou Islands Ramsar site	Disturbance and displacement	Gannet	N	Given their wide-ranging foraging behaviour (Thaxter *et al*., 2012; Wakefield *et al*., 2013; Warwick-Evans *et al*., 2016) and low sensitivity to disturbance from vessel traffic and associated activities (Garthe & Hüppop, 2004; Bradbury *et al*., 2014), there is no potential for impact on gannet.
		Storm petrel	N	Given their wide-ranging foraging behaviour (Wernham *et al*., 2002; Thaxter *et al*., 2012;) and low sensitivity to disturbance from vessel traffic and associated activities (Garthe & Hüppop, 2004; Bradbury *et al*., 2014), there is no potential for impact on storm petrel.
		Lesser black-backed gull	N	Given their wide-ranging foraging behaviour across terrestrial, intertidal and marine environments (Thaxter *et al*., 2012) and low sensitivity to disturbance from vessel traffic and associated activities (Garthe & Hüppop, 2004; Bradbury *et al*., 2014), there is no potential for impact on lesser black-backed gull.
	Indirect effects	Gannet	N	Given their wide-ranging, pelagic foraging behaviour (Thaxter *et al*., 2012; Wakefield *et al*., 2013; Warwick-Evans *et al*., 2016) and reliance on highly mobile schooling fish, squid and fishery discards (JNCC, 2016b), the short-term, temporary and localised effect of sediment release on benthic prey availability there is no potential for impact to this feature and LSE can be ruled out.

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
		Storm petrel	N	Storm petrels range widely across marine habitats to forage during the breeding season (Thaxter *et al*., 2012), feeding on small fish and zooplankton gleaned from the sea surface. Inshore they are known to feed on intertidal crustaceans. Given their plasticity in diet, the short-term, temporary and localised effect of sediment release activity on benthic prey availability there is no potential for impact to this feature and LSE can be ruled out.
		Lesser black-backed gull	N	Lesser black-backed gulls utilise terrestrial, intertidal and marine habitats for foraging, taking a wide variety of prey species including invertebrates, small fish and carrion (including fishery discards). Given the plasticity shown by lesser black-backed gulls in their foraging behaviour (Natural England, 2019d), the short-term, temporary and localised effect of sediment release on benthic prey availability there is no potential for impact to this feature and LSE can be ruled out.
	Collision	Gannet	N	Structures or devices which have the potential to pose an above water collision risk to gannets will not be introduced during any development phase. Whilst diving species such as gannets are considered to be vulnerable to below water collisions (Furness *et al*., 2012), the potential for impact is considered to be negligible given the wide-foraging range of this species compared to the highly localised and temporary area of potential impact from cable laying, repair and maintenance activities and LSE can be ruled out.
		Storm petrel	N	Structures or devices which have the potential to pose an above water collision risk to storm petrels will not be introduced during any development phase. Surface feeding species including petrels are not considered to be vulnerable to below water collisions (Furness *et al*., 2012).
		Lesser black-backed gull	N	Structures or devices which have the potential to pose an above water collision risk to lesser black-backed gulls will not be introduced during any development phase. Surface feeding species including gulls are not considered to be vulnerable to below water collisions (Furness *et al*., 2012).
	INIS	Gannet	N	There is no pathway for marine works associated with the Proposed Development to introduce invasive non-indigenous predators (e.g. mink) to the gannet breeding colony on Alderney given the distance between this site and the Proposed Development.
		Storm petrel	N	There is no pathway for marine works associated with the Proposed Development to introduce invasive non-indigenous predators (e.g. mink) to the storm breeding colony on Alderney given the distance between this site and the Proposed Development.
		Lesser black-backed gull	N	There is no pathway for marine works associated with the Proposed Development to introduce invasive non-indigenous predators (e.g. mink) to the lesser black-backed gull breeding colony on Alderney given the distance between this site and the Proposed Development.
	Accidental spills	Gannet	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect gannets when in contact with the sea surface through direct oiling resulting in mortality.
		Storm petrel	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect storm petrels when in contact with the sea surface through direct oiling resulting in mortality.

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
		Lesser black-backed gull	Y	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect lesser black-backed gulls when in contact with the sea surface through direct oiling resulting in mortality.
	Litter	Gannet	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect gannets when utilising the sea surface through ingestion or entanglement resulting in mortality.
		Storm petrel	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect storm petrels when utilising the sea surface through ingestion or entanglement resulting in mortality.
		Lesser black-backed gull	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect lesser black-backed gulls when utilising the sea surface through ingestion or entanglement resulting in mortality.

7.3. ASSESSMENT OF LSE – ONSHORE ENVIRONMENT

7.3.1.1. An assessment of LSE on designated onshore ecological features during the construction, operation and decommissioning phases of the Proposed Development is provided in Table 7.10.

Table 7.10 - Assessment of LSE on designated onshore ecology features across all phases of the Proposed Development

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
Chichester and Langstone Harbours SPA/Ramsar site	Disturbance and displacement	Little tern	N	Foraging little terns are considered to be of moderate sensitivity to disturbance from vessel traffic (Garthe & Hüppop, 2004; Bradbury *et al*., 2014) although their sensitivity to disturbance from onshore activities is uncertain. While little tern colonies exist within both Chichester and Langstone Harbours, specific surveys for the Proposed Development did not locate any breeding individuals or indeed foraging flights as detailed in the Breeding Bird Survey Report (APP-420). Therefore, little terns are not expected to be exposed to disturbance and displacement effects from any phase of the Proposed Development.
		Sandwich tern	N	Foraging Sandwich terns are considered to be of low sensitivity to disturbance from vessel traffic and associated activities (Garthe & Hüppop, 2004; Bradbury *et al*., 2014), although their sensitivity to disturbance from onshore activities is uncertain. Indeed, Sandwich terns are known to breed and forage within both Chichester and Langstone Harbours (Wilson *et al*., 2014; Natural England, 2016; Natural England, 2019a. Specific surveys for the Proposed Development did not locate any breeding individuals or indeed foraging flights as detailed in the Breeding Bird Survey Report (APP-420). Therefore, Sandwich terns are not expected to be exposed to disturbance and displacement effects from any phase of the Proposed Development.
		Common tern	N	Foraging common terns are considered to be of low sensitivity to disturbance from vessel traffic and associated activities (Garthe & Hüppop, 2004; Bradbury *et al*., 2014) although their sensitivity to disturbance from onshore activities is uncertain. Common terns are known to breed and forage within both Chichester and Langstone Harbours (Wilson *et al*., 2014; Natural England, 2016; Natural England, 2019a. Specific surveys for the Proposed Development did not locate any breeding individuals or indeed foraging flights as detailed in the Breeding Bird Survey Report (APP-420). Therefore, common terns are not expected to be exposed to disturbance and displacement effects from any phase of the Proposed Development.
		Dark-bellied brent goose Redshank Shelduck	Y	Dark-bellied brent goose, redshank and shelduck are considered highly sensitive to disturbance effects (Cutts *et al*., 2013). Specific surveys of intertidal habitat adjacent to the onshore element of the Proposed Development recorded each of these species in abundance while dark-bellied brent geese were also recorded utilising multiple identified terrestrial strategy sites as detailed in the Wintering Bird Survey Report (APP-421). Therefore, noise and visual impacts from both construction and decommissioning works from onshore elements of the Proposed Development could result in disturbance of the feature and possible temporary displacement.
		Pintail Shoveler Teal Wigeon Bar-tailed godwit Black-tailed godwit Curlew Grey plover	Y	Pintail, shoveler, teal and wigeon were not included in Cutts *et. al.* (2013) and therefore proxy species are considered to determine their sensitivity to disturbance. Mallard (a dabbling duck with similar ecological niche to shoveler, wigeon and pintail) is considered to be moderately sensitive. It is therefore assumed for the purposes of this assessment that these four species of wildfowl are also moderately sensitive to disturbance effects. Curlew, grey plover and bar-tailed godwit are also deemed to be moderately sensitive to disturbance (Cutts *et al.,* 2013 – where the findings relating to black-tailed godwit are taken here as proxy for bar-tailed). All these species were recorded in varying numbers in intertidal areas adjacent to the onshore works of the Proposed Development as detailed in the Wintering Bird Survey Report (APP-421). Therefore, noise and visual impacts from both construction and decommissioning works from onshore elements of the Proposed Development could result in disturbance of the feature and possible temporary displacement.

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
		Turnstone Sanderling Ringed plover Dunlin	N	Cutts *et al.* (2013) determines that turnstone, sanderling, ringed plover and dunlin are of low sensitivity to disturbance. Although all these species were found to be present in intertidal habitat adjacent to onshore works of the Proposed Development as detailed in the Wintering Bird Survey Report (APP-421) these species are considered to be extremely tolerant of any disturbance mechanisms from the Proposed Development and are likely to rapidly habituate.
		Waterfowl assemblage	Y	The cited waterfowl assemblage for the SPA includes contributions from species that are highly or moderately sensitive to disturbance. Therefore, noise and visual effects from construction and decommissioning works from onshore elements of the Proposed Development could result in disturbance of the assemblage and possible temporary displacement.
		Supporting habitat (freshwater and coastal grazing marsh)	N	Disturbance and displacement of supporting habitat relevant to onshore ecology (freshwater and coastal grazing marsh) is considered to be negligible since it is considered that the habitats present are not sensitive to vibration.
	Indirect effects	Sandwich tern Little tern Common tern Pintail Shoveler Teal Wigeon Turnstone Dark-bellied brent goose Sanderling Dunlin Grey plover Ringed plover Bar-tailed godwit Curlew Shelduck Redshank Waterfowl assemblage	N	Wading and wildfowl species are not expected to be affected by any changes to prey species. Increases in suspended sediment as a result of HDD works, cable burial activities and cable maintenance is expected to be highly localised and return to within comparable background concentrations within days. Terns are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey in the water column. They are considered to be moderately sensitive to habitat disturbance and subsequent potential effects on prey (Bradbury *et al*., 2014). However, given the distance between the Proposed Development and favoured foraging and breeding grounds of terns species, it is considered that there is no potential for impact during any development phase.
		Supporting habitat (freshwater and coastal grazing marsh)	Y	Onshore works have the potential to result in temporary loss of supporting / functionally linked habitat during the construction phase.

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
	Accidental spills	Sandwich tern Little tern Common tern Pintail Shoveler Teal Wigeon Turnstone Dark-bellied brent goose Sanderling Dunlin Grey plover Ringed plover Bar-tailed godwit Curlew Shelduck Redshank Waterfowl assemblage	Y	Unplanned oil or chemical spillages from construction activity may occur during construction and decommissioning. Spills have the potential to directly affect all SPA features when in contact supporting habitat through direct oiling resulting in mortality.
		Supporting habitat (freshwater and coastal grazing marsh)	Y	Unplanned oil or chemical spillages from construction activity may occur during construction and decommissioning. Spills have the potential to directly affect supporting habitats and prey species resulting in mortality.
	Indirect effects	Sandwich tern Little tern Common tern Pintail Shoveler Teal Wigeon Turnstone Dark-bellied brent goose Sanderling Dunlin Grey plover Ringed plover Bar-tailed godwit Curlew Shelduck Redshank	N	Wading and wildfowl species are not expected to be affected by any changes in water turbidity. Increases in suspended sediment as a result of HDD works, cable burial activities and cable maintenance is expected to be highly localised and return to within comparable background concentrations within days. Terns are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey in the water column. They are considered to be moderately sensitive to habitat disturbance and subsequent potential effects on prey (Bradbury *et al.*, 2014). Given the distance between the Proposed Development and favoured foraging and breeding grounds of tern species, it is considered that there is no potential for impact during any development phase.

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
		Waterfowl assemblage		
		Supporting habitat (freshwater and coastal grazing marsh)	N	Onshore works are not expected to lead to increases in suspended sediment as a result of onshore works, and no effects on supporting habitats and prey species are therefore expected.
	INIS	Sandwich tern Little tern Common tern Pintail Wigeon Turnstone Dark-bellied brent goose Dunlin Grey plover Shelduck Redshank Waterfowl assemblage Supporting habitat (freshwater and coastal grazing marsh)	N	There is no pathway for onshore construction work activities associated with the Proposed Development to introduce invasive non-indigenous predators to tern breeding colonies. There is also considered to be no pathway of invasive non-indigenous species affecting other wader and wildfowl species in addition to supporting habitat.
	Litter	Sandwich tern Little tern Common tern Pintail Shoveler Teal Wigeon Turnstone Dark-bellied brent goose Sanderling Dunlin Grey plover Ringed plover Bar-tailed godwit Curlew	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect SPA features and supporting habitat when utilising intertidal habitat through ingestion or entanglement resulting in mortality.

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
		Shelduck Redshank Waterfowl assemblage Supporting habitat (freshwater and coastal grazing marsh)		
Portsmouth Harbour SPA/Ramsar site	Disturbance and displacement	Dark-bellied brent goose	Y	Dark-bellied brent goose is considered highly sensitive to disturbance effects (Cutts *et al.,* 2013). While noise or visual disturbance impacts will not reach the SPA there is considered potential for it to effect functionally linked habitat represented by SWBGS sites. Therefore, noise from construction and decommissioning works from onshore elements of the Proposed Development could result in disturbance of the feature and possible temporary displacement.
		Dunlin Black-tailed godwit Supporting habitat (freshwater and coastal grazing marsh)	N	The functionally linked habitat of SWBGS sites potentially impacted by the Proposed Development was found not to be utilised by any species apart from dark-bellied brent goose (as detailed in the Wintering Birds Report APP-421). The SWBGS sites concerned consist of recreational grassland, which is unsuitable for wading species such as dunlin and black-tailed godwit. Disturbance and displacement of supporting habitat relevant to onshore ecology (freshwater and coastal grazing marsh) is considered to be negligible since it is considered that the habitats present are not sensitive to vibration.
	Indirect effects	Dark-bellied brent goose Dunlin Black-tailed godwit	N	Given the distance between the Proposed Development and favoured foraging, breeding and roosting grounds of the SPA, it is considered that there is no pathway for potential impact on qualifying features or supporting habitat.
		Supporting habitat (freshwater and coastal grazing marsh)	Y	Onshore works have the potential to result in temporary loss during the construction phase of supporting habitat (functionally linked SWBGS sites) that is outside of the SPA.
	INIS	Dark-bellied brent goose Dunlin Black-tailed godwit Supporting habitat	N	Given the distance between the Proposed Development and favoured foraging, breeding and roosting grounds of the SPA, it is considered that there is no pathway for potential impact on either qualifying features or supporting habitat through invasive non-indigenous species.

Relevant SPA/Ramsar site	Effect	Feature	LSE?	Justification
	Accidental spills	Dark-bellied brent goose Dunlin Black-tailed godwit Supporting habitat	Y	Unplanned oil or chemical spillages from construction activity may occur during construction and decommissioning. Spills have the potential to directly affect all SPA features and supporting habitat when in contact supporting habitat through direct oiling resulting in mortality.
	Litter	Dark-bellied brent goose Dunlin Black-tailed godwit Supporting habitat	Y	Unplanned disposal of industrial or user plastic during all development phases has the potential to directly affect SPA features and supporting habitat when utilising intertidal habitat through ingestion or entanglement resulting in mortality.

8. IN COMBINATION EFFECTS

8.1. OVERVIEW

8.1.1.1. PINS Advice Note Ten: Habitats Regulations Assessment (version 8, November 2017) indicates that an appraisal of the effects of any other plans or projects which, in combination with the Proposed Development, might be likely to have a significant effect on the European site(s) should be undertaken. The scope of this appraisal should be clearly agreed with SNCBs.

8.1.1.2. The advice notes that the following projects/plans should be considered;

- projects that are under construction;
- permitted application(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.

8.1.1.3. In the context of the Proposed Development, a three-tiered approach has been used that is considered to encompass the projects/plans listed above;

- Tier 1: The Proposed Development 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: Projects/plans on the PINS Programme of Projects 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 (PINS, 2015).

8.1.1.4. The projects and plans shown in tables in Appendix 3 (In Combination Marine Projects, APP-503) were selected as relevant to the assessment of in combination effects for marine sites and have been sourced from interrogation of the MMO Marine Information System, PINS Programme of Projects, The Crown Estate maps and Geographical Information Systems ('GIS') database and relevant Local Planning Authority ('LPA') planning portals.

8.1.1.5. This list was compiled on 31 May 2020 considered to be sufficient for undertaking an appraisal of the effects of any other marine plans or projects, in combination with the Proposed Development. Figure 8.1 (APP-500) illustrates the locations of all the marine projects considered and listed in the tables in Appendix 3.

8.1.1.6. Distances shown in Appendix 3 (Tables 1-4 for marine projects and Table 5 for onshore projects) are approximate and are measured from the closest point of the project or plan as shown on the MMO Marine Information System (where relevant) or planning information to the closest point of the Proposed Development.

8.1.1.7. A scoping report for Rampion Offshore Wind Farm Extension (Rampion 2) was submitted to PINS in July 2020. The location of the Rampion 2 project is displayed on Figure 8.1 as Project ID No. 3 (APP-500).

8.1.1.8. Since the scoping report has been submitted, the Applicant has undertaken a review of the information contained within the Rampion 2 Scoping Report and has also submitted a consultation response on the report to PINS as a Consultation Body under Regulation 11 of the Infrastructure Planning (EIA) Regulations 2017. In undertaking this review and in providing this response, it is evident that the design and timescales of Rampion 2 remain very much in the early stages and the information within the scoping report is not sufficient for a meaningful assessment to be undertaken.

8.1.1.9. Assessments are undertaken using the PINS screening matrices presented in Appendix 1 and Appendix 5 (APP-501, Rev 002 and 7.7.10) which present assessment of likely effects on European marine site and Ramsar features (both marine and onshore) from the Proposed Development alone (see Section 7) and in combination with other projects.

8.2. MARINE ENVIRONMENT

8.2.1. ANNEX I HABITATS

8.2.1.1. As there will be no work undertaken within any SAC (recognising the use of HDD under Solent Maritime SAC), the potential for in combination effects is only considered to arise from indirect effects, and of these only increased SSC and sediment deposition are considered to have potential to lead to potentially significant in-combination effects. All other effects are of such limited magnitude that it is considered that no potential for in combination effects exists that could lead to LSE. As all features of the Solent Maritime SAC and South Wight Maritime SAC with connectivity have been screened in due to potential for LSE arising from SSC and deposited sediments from the Proposed Development alone, no in-combination assessment is deemed to be required at LSE stage. In-combination effects will be considered as part of the shadow AA.

8.2.2. ANNEX II DIADROMOUS MIGRATORY FISH

8.2.2.1. The Annex II diadromous migratory fish in combination assessment has been presented in the PINS matrices (see Appendix 1 and Appendix 5). The contribution of the Proposed Development to potential in combination effects was assessed. The in-combination assessment includes all effects other than those where LSE could not be ruled out (SSC for salmon and sea lamprey of the Itchen and Avon SAC and Pollution events for all sites).

8.2.2.2. All other features and sites where it was concluded that no LSE would arise due to the project alone have been assessed against the in-combination projects listed in Table 2: Appendix 3. Plans and projects were removed from the in-combination assessment where they:

- have a licence end date prior to 2021 - therefore no temporary overlap and no potential for LSE;
- are onshore only - therefore no interaction with marine features and no potential for LSE; and
- are beyond the 12 nmi limit - therefore outside the coastal migration pathways and in open sea where alternative habitat is widely available and no potential for LSE.

8.2.2.3. In summary, there is considered to be negligible potential for the Proposed Development to contribute to any potential in combination effects on Annex II migratory diadromous fish species. It is considered that any in-combination SSC will not cause a barrier to migration to or from any SAC for which these species are features. In addition, any potential for in-combination noise levels are considered unlikely to produce sound levels at a level to induce audible injury or mortality to any species, and no barriers to key migration routes are predicted as a result of in combination underwater noise. Therefore, no LSE as a result of the contribution of the Proposed Development to any potential in combination effects on the Annex II diadromous migratory fish features of UK or French SACs and Ramsars can be concluded.

8.2.3. MARINE MAMMALS

8.2.3.1. The list of plans or projects assessed is shown in Table 3 of Appendix 3. Projects or plans with licence end dates prior to 2021 have been excluded from further appraisal since there will be no temporal overlap with the Proposed Development, and therefore no enduring impacts which are considered to have potential to result in in combination effects. This is because the marine mammal baseline will be unaffected by these projects/plans. Purely onshore projects have also been excluded.

8.2.3.2. The marine mammal in combination assessment has been presented in the PINS matrices (see Appendix 1). The contribution of the Proposed Development to potential in combination effects was assessed. The in-combination assessment includes all effects other than those where LSE could not be ruled out, i.e. pollution events.

8.2.3.3. In summary, there is considered to be negligible potential for the Proposed Development to contribute to any potential in combination effects on either bottlenose dolphin, harbour porpoise, grey seal or harbour seal which are qualifying features of the French SACs considered. This is because there is negligible potential for the sound produced by the Proposed Development to induce the onset of auditory injury (PTS), any disturbance is likely to be temporary and reversible with suitable alternative local habitat being available in the meantime, the risk of collision with vessels is considered to be negligible, and short term local level changes in prey availability/quality as a result of indirect effects are unlikely to result in a reduction in either fitness or breeding success. Therefore, no LSE as a result of the contribution of the Proposed Development to any potential in combination effects on the marine mammal features of the French SACs/Ramsar can be concluded.

8.2.3.4. Because the potential for connectivity of marine mammals which use the UK SACs and the Proposed Development is considered to be negligible, there is no potential for the Proposed Development to contribute to any potential in combination effects on the marine mammal qualifying features of the UK SACs considered.

8.2.4. MARINE ORNITHOLOGY

8.2.4.1. The list of plans or projects assessed is shown in Table 4 of Appendix 3. Projects or plans with licence end dates prior to 2021 have been excluded from further appraisal since there will be no temporal overlap with the Proposed Development, and therefore no enduring impacts which are considered to have potential to result in in combination effects.

8.2.4.2. The ZOI in which in combination effects on breeding marine ornithological features may occur has been defined according their mean-maximum foraging range (Thaxter *et al*., 2012). Plans or projects that fall within the mean-maximum foraging range of a particular species from a European site have been included in the list presented in Table 4 in Appendix 3.

8.2.4.3. More recent tracking data is available for gannets breeding within the Alderney West Coast and Burhou Islands Ramsar (Warwick-Evans *et al*., 2016), which has shown that the mean-maximum foraging range for this colony is smaller than that cited by Thaxter *et al*., (2012) (135 ± 7 km versus 229 ± 124 km). Thus, the use of Thaxter *et al*., (2012) to define the ZOI for in combination effects is considered to be a conservative approach for this species.

8.2.4.4. All species pre-screened into the marine ornithology assessment are breeding features, with the exception of red-breasted merganser. The spatial extent of in combination effects for this non-breeding feature is considered to be encompassed by the ZOI for breeding features, since wintering ranges of inshore waterfowl are generally smaller than the breeding ranges of seabirds (e.g. a mean-maximum of 229 km for breeding gannet, versus the extent of Portsmouth, Langstone and Chichester Harbours for wintering red-breasted merganser). Indeed, the largest aggregations of inshore wintering waterfowl will be found within the boundaries of those marine areas designated for their protection, since many species show relatively high fidelity to wintering sites. For example, resightings of wing-tagged red-breasted mergansers off the north-east of England provided evidence that birds were faithful to wintering sites between years (Wernham *et al*., 1997).

8.2.4.5. For those European sites and features where LSE could not be excluded for the project alone (see Table 9.1, Section 9 for a summary), in combination effects are considered under Stage 2, determination of potential adverse effects on site integrity (Section 10).

8.2.4.6. For those European Marine and Ramsar sites and features where no LSE could be concluded for the project alone, no plans or projects identified in the ZOI are considered likely to act in combination with the Proposed Development due to the scale over which project alone effects are predicted to occur (see Appendix 1 and Appendix 5 PINS matrices for further details).

8.3. ONSHORE ENVIRONMENT

8.3.1.1. The list of plans/projects which could act in-combination with the Proposed Development on onshore ecological features is based on the list in Table 5 of Appendix 3.

8.3.1.2. For those European sites and features where no LSE could not be concluded for the Proposed Development alone (see Section 7.3 for a summary), in combination effects are considered under Stage 2, determination of potential adverse effects on site integrity (Section 10).

8.3.1.3. For those European and Ramsar sites and features where no LSE could be concluded for the Proposed Development alone, no plans or projects identified in the ZOI are considered likely to act in combination with the Proposed Development due to the scale over which project alone effects are predicted to occur (see Appendix 1 and Appendix 5 PINS matrices for further details).

9. SUMMARY OF LIKELY SIGNIFICANT EFFECTS

9.1. MARINE ENVIRONMENT

9.1.1.1. Table 9.1 summarises those European Marine and Ramsar sites and features for which LSE could not be excluded, which have been progressed to Stage 2 (Section 10).

9.1.2. ANNEX I HABITATS

9.1.2.1. Annex I Habitats within the Solent Maritime SAC and South Wight Maritime SAC have been assessed for LSE.

9.1.2.2. It was found that LSE could not be excluded for the following Solent Maritime SAC features as a result of increased SSC, deposition of sediments, pollution, and invasive species:

- Estuaries [1130];
- Sandbanks which are slightly covered by sea water all the time [1110];
- Mudflats and sandflats not covered by seawater at low tide [1140];
- Spartina swards [1320];
- Atlantic salt meadows [1330]; and
- Salicornia and other annuals colonising mud and sand [1310].

9.1.2.3. LSE could not be excluded for the following South Wight Maritime SAC features as a result of increased SSC, deposition of sediments, pollution, and invasive species:

- Reefs [1170] and;
- Submerged or partially submerged sea caves [8330];

9.1.3. ANNEX II DIADROMOUS MIGRATORY FISH

9.1.3.1. The designated sites which list Annex II diadromous migratory fish features which fall within the study area (the Channel) for this HRA have been assessed both alone and in combination with other projects.

9.1.3.2. It was found that LSE could not be ruled out due to the effects of potential pollution events at all pre-screened in sites. It was also concluded that LSE could not be ruled out for Annex II migratory fish species in the River Itchen SAC and River Avon SAC as a result of increased SSC.

9.1.3.3. No LSE as a result of all other effects was concluded for all sites identified at the pre-screening stage (see Section 6.2) either alone or in combination with other plans and projects.

9.1.4. MARINE MAMMALS

9.1.4.1. The potential for LSE on the Annex II marine mammal species which are qualifying features of the designated sites which fall within the eastern Channel has been assessed for the Proposed Development both alone and in combination with other plans and projects.

9.1.4.2. It was found that LSE could not be ruled out due to the effects of potential pollution events at all sites. No LSE as a result of auditory injury, disturbance, collision or other indirect effects is concluded for all sites identified at the pre-screening stage (see Section 6.2) either alone or in combination with other plans and projects.

9.1.5. MARINE ORNITHOLOGY

9.1.5.1. The designated sites which list Annex I and regularly occurring migratory marine birds which fall within the ZOI have been assessed both alone and in combination with other plans and projects.

Table 9.1 - European sites and features for which LSE could not be excluded for both the project alone and in combination with other plans and projects

European site	Feature	Effect	Project phase/s
Solent and Dorset Coast SPA	Little tern	Disturbance and displacement	Construction, Operation and Decommissioning
		Indirect effects	
		Accidental spills	
		Litter	
	Sandwich tern	Indirect effects	
		Accidental spills	
		Litter	
	Common tern	Indirect effects	
		Accidental spills	
		Litter	
	Supporting habitat (water column)	Indirect effects	
		Accidental spills	
		Litter	
Chichester and Langstone Harbours SPA/Ramsar site	Red-breasted merganser	Disturbance and displacement	Construction, Operation and Decommissioning
		Indirect effects	
		Accidental spills	
		Litter	
	Little tern	Disturbance and displacement	
		Indirect effects	
		Accidental spills	
		Litter	
	Sandwich tern	Indirect effects	
		Accidental spills	
		Litter	
	Common tern	Indirect effects	
		Accidental spills	
		Litter	
	Supporting habitat (water column)	Indirect effects	
		Accidental spills	
		Litter	
Portsmouth Harbour SPA/Ramsar site	Red-breasted merganser	Accidental spills	Construction, Operation and Decommissioning
		Litter	
	Supporting habitat (water column)	Accidental spills	
		Litter	
Solent and Southampton Water SPA/Ramsar site	Little tern	Accidental spills	Construction, Operation and Decommissioning
		Litter	

European site	Feature	Effect	Project phase/s
	Common tern	Accidental spills	
		Litter	
	Sandwich tern	Accidental spills	
		Litter	
	Roseate tern	Accidental spills	
		Litter	
	Mediterranean gull	Accidental spills	
		Litter	
	Supporting habitat (water column)	Accidental spills	
		Litter	
Pagham Harbour SPA/Ramsar site	Common tern	Accidental spills	Construction, Operation and Decommissioning
		Litter	
	Supporting habitat (water column)	Accidental spills	
		Litter	
Littoral-Seino Marin SPA	Fulmar	Accidental spills	Construction, Operation and Decommissioning
		Litter	
	Kittiwake	Accidental spills	
		Litter	
	Herring gull	Accidental spills	
		Litter	
	Great black-backed gull	Accidental spills	
		Litter	
Alderney West Coast and Burhou Islands Ramsar site	Gannet	Accidental spills	Construction, Operation and Decommissioning
		Litter	
	Storm petrel	Accidental spills	
		Litter	
	Lesser black-backed gull	Accidental spills	
		Litter	
River Itchen SAC	Salmon	Increased SSC	Construction, Operation and Decommissioning
		Pollution Events	
River Avon SAC	Salmon	Increased SSC	Construction, Operation and Decommissioning
		Pollution events	
	Sea lamprey	Increased SSC	
		Pollution Events	
Littoral Cauchois SAC	Bottlenose Dolphin	Pollution	Construction, Operation and Decommissioning
	Harbour Porpoise	Pollution	
	Grey Seal	Pollution	

European site	Feature	Effect	Project phase/s
	Harbour Seal	Pollution	
	Twaite shad	Pollution Events	
	Sea lamprey	Pollution Events	
	River lamprey	Pollution Events	
Estuaires et Littoral Picards (Baies de Somme et d'Authie) SAC/Baie de Somme Ramsar	Bottlenose Dolphin	Pollution	Construction, Operation and Decommissioning
	Harbour Porpoise	Pollution	
	Grey Seal	Pollution	
	Harbour Seal	Pollution	
	River lamprey	Pollution Events	
Baie de Canche et Couloir des trois Estuaires SAC	Harbour Porpoise	Pollution	Construction, Operation and Decommissioning
	Grey Seal	Pollution	
	Harbour Seal	Pollution	
	Allis shad	Pollution Events	
	Sea lamprey	Pollution Events	
	River lamprey	Pollution Events	
	Salmon	Pollution Events	
Baie de Seine Orientale SAC	Bottlenose Dolphin	Pollution	Construction, Operation and Decommissioning
	Harbour Porpoise	Pollution	
	Grey Seal	Pollution	
	Harbour Seal	Pollution	
	Allis shad	Pollution Events	
	Twaite shad	Pollution Events	
	Sea lamprey	Pollution Events	
	River lamprey	Pollution Events	
	Salmon	Pollution Events	
River Axe SAC	Sea lamprey	Pollution Events	Construction, Operation and Decommissioning
Estuaire de la Seine ZSC/Marais Vernier Ramsar	Twaite shad	Pollution Events	Construction, Operation and Decommissioning
	Sea lamprey	Pollution Events	
	River lamprey	Pollution Events	
	Salmon	Pollution Events	
Récifs Gris-Nez Blanc-Nez SAC	Harbour Porpoise	Pollution	Construction, Operation and Decommissioning
	Grey Seal	Pollution	
	Harbour Seal	Pollution	
Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC	Harbour Porpoise	Pollution	Construction, Operation and Decommissioning
	Grey Seal	Pollution	
	Harbour Seal	Pollution	
Estuaire de la Seine SAC	Harbour Porpoise	Pollution	Construction, Operation and Decommissioning

European site	Feature	Effect	Project phase/s
	Grey Seal	Pollution	
	Harbour Seal	Pollution	
Plymouth Sound and Estuaries SAC	Allis shad	Pollution Events	Construction, Operation and Decommissioning
Solent Maritime SAC	Estuaries [1130]	Increased SSC Deposition of Sediment (Smothering) Pollution Invasive Species	Construction, Operation and Decommissioning
	Sandbanks (slightly covered by seawater all the time) [1110]		
	Mudflats and sandflats (not submerged at low tide) [1140]		
	Spartina swards [1320]		
	Atlantic salt meadows [1330]		
	Salicornia and other annuals colonising mud and sand [1310]		
South Wight Maritime SAC	Reefs [1170]	Increased SSC Deposition of Sediment (Smothering) Pollution Invasive Species	
	Submerged or partially submerged sea caves [8330]		

9.2. ONSHORE ENVIRONMENT

9.2.1.1. The potential for LSE on onshore ecology features related to Annex I and regularly occurring migratory birds only. Such features which occur within the ZOI have been assessed in relation to onshore components of the Proposed Development both alone and in combination with other plans and projects.

9.2.1.2. Table 9.2 summarises those European sites and features for which no LSE could not be concluded, which have been progressed to Stage 2 (Section 10)

Table 9.2 - European sites and features for which no LSE could not be concluded with respect to onshore activities for both the project alone and in combination with other plans and projects

European site	Feature	Effect	Project phase/s
Chichester and Langstone Harbours SPA/Ramsar	Sandwich tern	Accidental spills	Construction,Operation and Decommissioning
		Litter	Construction,Operation and Decommissioning
	Common tern	Accidental spills	Construction,Operation and Decommissioning
		Litter	Construction,Operation and Decommissioning
	Little tern	Accidental spills	Construction,Operation and Decommissioning
		Litter	Construction,Operation and Decommissioning
	Dark-bellied brent goose	Disturbance and displacement	Construction and Decommissioning
		Accidental spills	Construction,Operation and Decommissioning
		Litter	Construction,Operation and Decommissioning
	Redshank	Disturbance and displacement	Construction and Decommissioning
		Accidental spills	Construction,Operation and Decommissioning
		Litter	Construction,Operation and Decommissioning
	Shelduck	Disturbance and displacement	Construction and Decommissioning
		Accidental spills	Construction,Operation and Decommissioning
		Litter	Construction,Operation and Decommissioning
	Pintail	Disturbance and displacement	Construction and Decommissioning
		Accidental spills	Construction,Operation and Decommissioning
		Litter	Construction,Operation and Decommissioning
	Shoveler	Disturbance and displacement	Construction and Decommissioning
		Accidental spills	Construction,Operation and Decommissioning
		Litter	Construction,Operation and Decommissioning
	Teal	Disturbance and displacement	Construction and Decommissioning
		Accidental spills	Construction,Operation and Decommissioning
		Litter	Construction,Operation and Decommissioning
	Wigeon	Disturbance and displacement	Construction and Decommissioning
		Accidental spills	Construction,Operation and Decommissioning
		Litter	Construction,Operation and Decommissioning
	Bar-tailed godwit	Disturbance and displacement	Construction and Decommissioning
		Accidental spills	Construction,Operation and Decommissioning
		Litter	Construction,Operation and Decommissioning
	Black-tailed godwit	Disturbance and displacement	Construction and Decommissioning

European site	Feature	Effect	Project phase/s
		Accidental spills	Construction, Operation and Decommissioning
	Curlew	Disturbance and displacement	Construction and Decommissioning
		Accidental spills	Construction,Operation and Decommissioning
		Litter	Construction,Operation and Decommissioning
	Turnstone	Accidental spills	Construction,Operation and Decommissioning
		Litter	Construction,Operation and Decommissioning
	Sanderling	Accidental spills	Construction,Operation and Decommissioning
		Litter	Construction,Operation and Decommissioning
	Grey plover	Disturbance and displacement	Construction and Decommissioning
		Accidental spills	Construction,Operation and Decommissioning
		Litter	Construction,Operation and Decommissioning
	Ringed plover	Accidental spills	Construction,Operation and Decommissioning
		Litter	Construction,Operation and Decommissioning
	Dunlin	Accidental spills	Construction,Operation and Decommissioning
		Litter	Construction,Operation and Decommissioning
	Waterfowl assemblage	Disturbance and displacement	Construction and Decommissioning
		Accidental spills	Construction, Operation and Decommissioning
		Litter	Construction, Operation and Decommissioning
	Supporting habitats (freshwater and grazing marsh)	Indirect effects (temporary habitat loss)	Construction and Decommissioning
		Accidental spills	Construction,Operation and Decommissioning
		Litter	Construction,Operation and Decommissioning
Portsmouth Harbour SPA/Ramsar	Dark-bellied brent goose	Disturbance and displacement	Construction and Decommissioning
		Accidental spills	Construction,Operation and Decommissioning
		Litter	Construction,Operation and Decommissioning
	Dunlin	Accidental spills	Construction,Operation and Decommissioning
		Litter	Construction,Operation and Decommissioning
	Black-tailed godwit	Accidental spills	Construction,Operation and Decommissioning
		Litter	Construction,Operation and Decommissioning
	Supporting habitats (freshwater and grazing marsh)	Indirect effects (temporary habitat loss)	Construction and Decommissioning
		Accidental spills	Construction, Operation and Decommissioning
		Litter	Construction, Operation and Decommissioning

10. DETERMINATION OF POTENTIAL ADVERSE EFFECTS (ONSHORE AND MARINE SITES)

10.1. OVERVIEW

10.1.1.1. Following the initial pre-LSE screening stage (Section 6) and subsequent determination of LSE (Sections 7 and 8), this section determines the potential for the Proposed Development to have an adverse effect on the European sites and features under Stage 2 of the HRA process, both from the project alone and in combination with other plans or projects.

10.1.1.2. Table 9.1 and 9.2 in Section 9 summarises those European sites and features for which LSE could not be excluded, which have been progressed to Stage 2.

10.1.1.3. The following sections should be read in conjunction with Appendix 1 and Appendix 5 of this report which presents the PINS integrity matrices for European Marine and Ramsar sites respectively.

10.2. APPROACH TO ASSESSMENT OF POTENTIAL ADVERSE EFFECTS

10.2.1. OVERVIEW

10.2.1.1. Determining whether, in view of a European site's conservation objectives, the plan or project 'either alone or in combination with other plans or project' would have an adverse effect on site integrity has been assessed in light of:

- Where available, Natural England's Designated Sites View Supplementary Advice on Conservation Objectives ('SACO');
- Site-specific information gathered for the environmental baseline;
- Evidence presented in the ES; and
- Reasoned argument, professional judgement and lessons learned from other marine cabling projects.

10.2.1.2. The following definitions and approach have been used to determine whether the Proposed Development would result in an adverse effect on the integrity of any European site identified as part of this HRA.

10.2.2. SITE INTEGRITY

10.2.2.1. The assessment of adverse effects on site integrity of a site is addressed in light of the conservation objectives of each site. The integrity of a site is defined as '*the coherence of the site's ecological structure and function, across its whole area, which enables it to sustain the habitat, complex of habitats and/or populations of species for which the site has been designated*' (ODPM Circular 06/2005).

10.2.2.2. European Commission guidance (2018) on Managing Natura 200 sites emphasises that site integrity involves its ecological structure, function and ecological processes and that the assessment of adverse effect should focus on, and be limited to, the site's conservation objectives.

10.2.3. ADVERSE EFFECT

10.2.3.1. The possible impacts of the Proposed Development during the construction, operation and decommissioning phases have been considered in the context of their effect on the qualifying features for the site under consideration.

10.2.3.2. An adverse effect on site 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 designation. In addition, an adverse effect would be one which caused a detectable reduction of the features for which a site was designated, at the scale of the site rather than at the scale of the location of the impact.

10.2.3.3. The Habitats Directive defines the conservation status of species as 'favourable' when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;
- The natural range of the species is neither being reduced for the foreseeable future; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

10.2.3.4. 'Favourable' conservation status of habitats is defined by the Habitats Directive as occurring when:

- Its natural range and areas it covers within that range are stable or increasing; and
- The species structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future.

10.2.3.5. The EC guidance (2018) also recommends that, when considering the 'integrity of the site', it is important to take account of the possibility that effects can manifest over the short, medium or long-term.

10.2.4. SUPPLEMENTARY ADVICE ON CONSERVATION OBJECTIVES

10.2.4.1. Natural England's SACO presents attributes which are ecological characteristics or requirements of the classified species within a site. The listed attributes are those which best describe the site's ecological integrity and which, if safeguarded, will enable achievement of the conservation objectives. These attributes have a target which is either quantified or qualified depending on the available evidence. The target identifies as far as possible the desired state to be achieved for the attribute.

10.2.4.2. In many cases, the attribute targets show if the current objective is to either 'maintain' or 'restore' the attribute. The targets given for each attribute do not represent thresholds to assess the significance of any given effect. Instead, these targets are used along with the conservation objectives, and any case-specific advice issued by Natural England when assessing a project that may affect site integrity. Any proposals or operations which may affect the site, or its features should be designed so they do not adversely affect any of the attributes in the SACO or achievement of the conservation objectives.

10.2.4.3. Where available, site-specific SACO have been taken into account when considering potential adverse effects on site integrity. For those impacts for which an LSE could not be ruled out, the equivalent attributes and their targets have been screened into the assessment. Further details are provided in each site-based assessment.

10.2.5. ADDITIONAL MITIGATION - MARINE

Disposal of Dredge Material

10.2.5.1. As outlined within Section 3.1.2, the LSE screening stage of the HRA considered a worst-case scenario for increased SSC and sediment deposition resulting from the disposal of dredged material (produced from sandwave clearance) along the entire Marine Cable Corridor. Under this scenario, the spatial extent of the sediment plume was 25 km, which was used as the ZOI for screening and determining LSE.

10.2.5.2. Subsequently, mitigation has been included at the AA stage which restricts the disposal of dredged material to take place in the designated disposal site (located between KP 21 and KP 109); thus, prohibiting disposal within the nearshore area (KP 0 – KP 21).

10.2.5.3. The following worst-case scenario has been used as the basis for assessing the possible adverse effects on site integrity as part of this AA, and the parameters assessed can be summarised as follows:

- Nearshore (KP0 – 21)
  - Worst-case activities which will lead to increased SSC are considered to be excavation of HDD pits, and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations).

- It is predicted that peak SSCs of up to 200 mg/l may be observed locally (i.e. within 2 km of the cable trench/HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench/pit at which point concentrations of 5 to 10 mg/l are predicted; SSC is expected to return to background levels within a few days following completion of these activities.
- Deposition is not predicted to be significant - any coarse material mobilised will deposit rapidly (i.e. within several hundred metres of the cable trench). Finer sediment will be dispersed across a greater spatial extent, transiently depositing throughout the tidal cycle. However, due to the volumes of sediment likely to be liberated into the water column and significant dispersion of fine sediment, it is considered that deposition will be negligible with sediments quickly resuspended and redistributed under the forcing of tidal flows.

- Offshore (Seaward of KP 21)
  - Peak SSC of 1000 mg/l within 1 km from the release point but coarser sediment expected to deposit quickly (almost immediately) with significant reductions of SSC within hours of disposal at each location.
  - Beyond 1 km from release, the passive plume which is transported beyond this is likely to generate SSC in the region of approximately 20 mg/l, transported in the direction of the prevailing flow out to a worst case distance of up to 25 km. SSC is predicted to reduce to background levels (<1 – 6 mg/l) within the timeframe of a few days following completion of these activities.
  - Sediment deposition from disposal activities will be local to the point of release (i.e. within 1000 m), with deposits of coarser sediments potentially observed to depths of between 10 mm and 1.5 m, with greatest deposition observed across an area of a few hundred metres, elongated in the direction of the prevailing flow at the time of release, relative to the release site. Finer sediments will be redistributed and any deposition outside the Marine Cable Corridor will be transient and negligible, with any settled material being quickly redistributed under the forcing of tidal flows.

Pollution Prevention

10.2.5.4. Standard best practice in terms of waste management and spill response procedures for offshore working will be adhered to, as described in the Marine Outline Construction Environmental Management Plan ('CEMP') (APP-488) submitted with the Application and secured through the Deemed Marine Licence ('dML') which is part of the Draft Development Consent Order (APP-019, Rev 002). 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.
- A Marine Pollution Contingency Plan required as part of the dML (APP-019, Rev 002) will be developed for the project 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.

Biosecurity Management

10.2.5.5. A Biosecurity Plan (required under the dML), will be developed for the project post-consent in order to reduce the likelihood of project activities introducing INIS to the local area to as low as is reasonably practicable.

10.2.5.6. The management of biosecurity focuses on three areas:

- Ballast Water Management;
- Antifouling; and
- Equipment

10.2.5.7. Further information on the outline practices that are proposed are summarised below as described in the Marine Outline CEMP (APP-488) submitted with the Application and secured through the dML.

- Vessels contracted to work on the Proposed Development 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*" (IMO, 1997);

- Vessels contracted to work on the Proposed Development 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 Proposed Development shall ensure all practical steps are taken to ensure equipment proposed for use on the project is not fouled by marine organisms.

10.2.6. SPA CONSERVATION OBJECTIVES

10.2.6.1. Conservation objectives apply to the site and the individual features and/or assemblages of features for which the site has been designated.

10.2.6.2. For those European Marine and Ramsar sites where LSE could not be excluded, the conservation objectives are to ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the aims of the Birds Directive, by maintaining or 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 qualifying features; and
- The distribution of qualifying features within the site.

10.2.6.3. Given that the populations and distribution of qualifying features are reliant on the extent, distribution, structure, function and processes of supporting habitat, assessment of indirect effects on the latter two conservation objectives is considered to encapsulate assessment of the conservation objectives related to supporting habitat, through consideration of SACO attributes relating to supporting habitat. As such, only the latter two conservation objectives relating to qualifying features have been taken forward for assessment.

10.2.6.4. Natural England in their advice on the draft HRA Report (dated 20 September 2019, see Appendix 4), confirmed they were content this approach as the Conservation Objectives relating to supporting habitats are encapsulated within the assessment of 'indirect effects' upon the qualifying features.

10.2.7. SAC CONSERVATION OBJECTIVES

10.2.7.1. Conservation objectives apply to the site and the individual features and/or assemblages of features for which the site has been designated.

10.2.7.2. For those European Marine and Ramsar sites in the UK where LSE could not be excluded, the conservation objectives are to ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the aims of the Habitats Directive, by maintaining or restoring:

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

10.2.7.3. For the sites where LSE could not be ruled out, an assessment of relevant conservation objectives (including consideration of sites specific targets) has been undertaken.

10.3. ONSHORE AND MARINE: CHICHESTER AND LANGSTONE HARBOURS SPA/RAMSAR SITE

10.3.1. OVERVIEW

10.3.1.1. Chichester and Langstone Harbours SPA/Ramsar covers two large, estuarine basins. Urban development surrounds the west of Langstone Harbour, whereas farmland surrounds the majority of Chichester Harbour. Together, with neighbouring Portsmouth Harbour, the area forms one of the most sheltered intertidal areas on the south coast of England.

10.3.1.2. Both Chichester and Langstone Harbours contain extensive intertidal mudflats and sandflats with areas of seagrass beds, saltmarsh, shallow coastal waters, coastal lagoons, coastal grazing marsh and shingle ridges and islands. These habitats support internationally and nationally important numbers of overwintering and breeding bird species.

10.3.1.3. At low tide the mudflats are exposed, the water is drained by channels and creeks which meet to form narrow exits into the Solent. The sediments support rich populations of intertidal invertebrates, which provide an important food source for overwintering birds. Several small freshwater streams flow into the harbours; however, these contribute relatively little freshwater input compared to the tidal flows.

10.3.1.4. There are more than 300 ha of seagrass beds (*Zostera noltii* and *Zostera marina*) in the SPA which are an important food source for dark-bellied brent geese (Natural England, 2019a). Overwintering birds also feed and roost in the saltmarsh areas, which are dominated by cordgrass (*Spartina*) swards, as well as on coastal grazing marsh.

10.3.1.5. The shingle ridges and islands within the site provide important nesting habitat for three species of tern during the summer breeding season. Adult terns use the shallow coastal waters in the harbours and the wider Solent to forage for small fish to feed themselves and their chicks.

10.3.1.6. Areas outside the SPA contain important supporting habitats for the birds, including coastal grazing marsh, amenity grassland and agricultural land (Natural England, 2019a).

10.3.2. MARINE CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES)

10.3.2.1. Site-specific SACO is available for the Chichester and Langstone Harbours SPA[Error! Bookmark not defined.]. Table 10.1 lists those attributes which are considered to be equivalent to those impacts for which an LSE could not be excluded for the marine environment.

Table 10.1 – Marine SACO attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Red-breasted merganser **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
Supporting habitat (water column)	Indirect effects	Supporting habitat: water quality - DO
		Supporting habitat: water quality - turbidity
	Accidental spills and Litter	Supporting habitat: water quality - contaminants

10.3.2.2. Non-equivalent attributes listed within the SACO which were screened out from further assessment included:

- Breeding population: abundance;
- Connectivity with supporting habitats;
- Predation - all habitats;
- Supporting habitat: air quality;
- Supporting habitat: conservation measures;
- Supporting habitat: extent and distribution of supporting habitat for the breeding season;
- Supporting habitat: landform;
- Supporting habitat: vegetation characteristics for nesting; and
- Supporting habitat: water quality – nutrients.

10.3.3. ONSHORE CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES)

10.3.3.1. Table 10.2 lists those attributes which are considered to be equivalent to those impacts for which an LSE could not be excluded for the onshore environment.

Table 10.2 – Onshore SACO attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent attribute
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

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Little tern **Sandwich tern** **Common tern** **Dark-bellied brent goose** **Redshank** **Shelduck** **Pintail** **Shoveler** **Teal** **Wigeon** **Bar-tailed godwit** **Black-tailed godwit** **Curlew** **Turnstone** **Sanderling** **Grey plover** **Ringed plover** **Dunlin**	Accidental spills and Litter	Supporting habitat: food availability
Waterfowl assemblage	Accidental spills and Litter	Supporting habitat: quality of supporting non-breeding habitat
Supporting habitat (freshwater and coastal grazing marsh)	Indirect effects	Supporting habitat: extent and distribution of supporting habitat for the non-breeding season
	Accidental spills and Litter	Supporting habitat quality of supporting non-breeding habitat

10.3.4. ONSHORE AND MARINE ASSESSMENTS OF POTENTIAL ADVERSE EFFECTS ON SITE INTEGRITY

10.3.4.1. For those designated features where LSE could not be excluded, an assessment of potential adverse effects on site integrity is presented in Table 10.3 for marine features and Table 10.4 for onshore/intertidal features below.

10.3.4.2. It is concluded that there will be no adverse effect on the site integrity of Chichester and Langstone Harbours SPA/Ramsar, either from the Proposed Development alone, or in combination with other plans or projects.

Table 10.3 – Marine assessment of potential adverse effects on site integrity for the Chichester and Langstone Harbours SPA/Ramsar site across all phases of the Proposed Development both alone and in combination with other plans or projects

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Red-breasted merganser	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Disturbance and displacement	Disturbance caused by human activity	Reduce the frequency, duration and/or intensity of disturbance affecting roosting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed.	Red-breasted merganser are considered to be of moderate sensitivity to disturbance and therefore displacement (Bradbury *et al*., 2014; Gittings & O'Donoghue, 2016). Within Langstone Harbour, red-breasted mergansers are known to both feed and roost in internationally important numbers. It is considered that onshore HDD works within the harbour have the highest potential of all construction activities to cause disturbance and displacement to this species. Of the three onshore HDD locations (see Chapter 3 Description of the Proposed Development for locations), HDD3 at Kendall's Wharf is the closest location to favoured red-breasted merganser roosting areas east of Farlington Marshes and towards Langstone Bridge (c.1 km). Sheet piling at this location may therefore disturb and displace birds through unpredictable noise events. However, these works will be above MHWS in an already industrialised setting. Vibro-hammering will be very short in duration (two hours for installation at each location) and noise levels from the EMV at HDD3 will be < 50 dB at Farlington Marshes, given that SPLs reduce by 6 dB each time the distance is doubled. Noise and visual disturbance associated with construction activities at HDD3 will not be noticeable above baseline levels of disturbance within the urban setting of Langstone Harbour (Cutts & Allen, 1999; Cutts *et al*., 2009). Given that HDD1 and HDD2 are located further away from red-breasted merganser roosting areas, it is considered that there is no potential for impact from onshore HDD works at these locations, both of which are located above MHWS in an urban environment Outside of Langstone Harbour, red-breasted mergansers may be present in shallow, nearshore waters throughout the Solent. There is therefore potential for foraging and roosting birds to be disturbed and therefore displaced by both unpredictable noise events and visual disturbance associated with construction activities at the marine HDD location off Eastney, and elsewhere within the Marine Cable Corridor. Vibro-hammering at the marine HDD location will be short in duration and noise generated by the vibro-hammers and pipe-driving machine will be non-percussive and airbourne SPLs will not be noticeable above the baseline in this urban setting. Red-breasted mergansers dive from the sea surface to forage in water depths of <10 m (Robbins, 2017). Whilst they may be

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					exposed to underwater noise resulting from the vibro-hammer and pipe driving machine during this time, noise levels will not be discernible above background underwater noise levels (median noise levels around the UK range from 81.5 to 95.5 dB re 1 μPa; Merchant *et al*., 2016). A single jack-up vessel, together with a multicat, a safety vessel, a crew transfer vessel and up to four workboats may be present at the marine HDD location for up to 44 weeks, with a total of 636 vessel movements predicted over this period. This will not be noticeable above baseline levels of disturbance from the existing high levels of traffic within the area. Throughout the rest of the Marine Cable Corridor, it is anticipated that there may be up to c.825 vessel movements over the course of the anticipated 30-month 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. Whilst there may be a number of vessels present during each stage of installation, it is likely that each vessel will only be present in any one area of the rolling safe passage distance for very short durations (hours to days). The potential grounding of cable lay barges at low tide between KP 1.0 and KP 4.7 will occur over a short duration of up to 4 weeks. Furthermore, vessel traffic levels in the Channel and Solent are already high. As such, red-breasted mergansers that use the Marine Cable Corridor to forage and roost will be habituated to such levels of disturbance. During operation, an indicative worst-case failure rate of the Marine Cables would require once repair every 10-12 years. It is therefore considered that potential disturbance/displacement effects on red-breasted mergansers would be less than predicted during construction. Therefore, it is considered that potential disturbance and displacement from the Proposed Development alone will not result in an adverse effect on red-breasted merganser as a qualifying feature of this SPA, and therefore no adverse effects on site integrity are predicted. Potential effects resulting from plans or projects which have temporal and spatial overlap with the Proposed Development (Table 4 of Appendix 3) are considered to be highly localised and temporary. As such, it is concluded that there will be no adverse effect on site integrity from disturbance and displacement effects, either alone or in combination with other project and plans (see Appendix 1 PINS matrices for further details).

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
		Indirect effects	Supporting habitat: food availability	Maintain the distribution, abundance and availability of key food and prey items (e.g. salmon, brook lamprey, minnow, gobies, eels, stickleback, gobies, flatfish, herring, shrimps, *Nereis*) at preferred sizes (e.g.<11 cm)	Red-breasted mergansers are effectively top predators of benthos, fish and shellfish populations and are considered to be of moderate sensitivity to habitat disturbance (Bradbury *et al*., 2014). If seabed habitats (and therefore the prey species) are disturbed, the area may be temporarily devoid of any potential food sources, resulting in effective habitat loss. Furthermore, red-breasted mergansers are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey. Activities associated with construction have the potential to release sediment into the water column during cable burial and associated works. Within Langstone Harbour where red-breasted merganser numbers are likely to be highest, HDD will be used. The entry/exit points of the drill are expected to be onshore, thus there is no pathway for the works to result in an increase in suspended sediment or resultant smothering. Therefore, the works are considered to have no effect on red-breasted merganser prey species in Langstone Harbour. Outside of Langstone Harbour, excavation at the marine HDD pits (KP 1.0-1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations) will transport the finest sediments up to 10 km from the release point. However, SSC at these distances will be low (< 5 mg/l) and therefore not discernible above natural variation, which ranges from approximately <5 to 75 mg/l in coastal areas. In consequence, there will be no effects on prey species at the Landfall Elsewhere within the Marine Cable Corridor, the area of disturbed habitat for route preparation is anticipated to be a maximum of 3.6 km^2 along the entire Marine Cable Corridor (*c*.6%). High densities of red-breasted merganser are not predicted beyond KP 21 given the species' preference for shallow, coastal waters (Robbins, 2017). Within the nearshore area where densities are likely to be highest (KP 0-21, it is predicted that a peak SSC of up to 200 mg/l may be observed locally (i.e. within 2 km of the cable trench/HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also predicted to be transported up to 5 km from the cable trench/HDD pit at which point concentrations of 5 to 10 mg/l are predicted; SSC is expected to return to background levels within a few days following completion of these activities. Most fish and shellfish are able to tolerate a degree of suspended sediment owing to frequent exposure to storm

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					induced fluctuations in sediment concentrations. Indeed, background levels of suspended sediment in the Solent are already highly turbid (Guillou *et al*., 2017). During operation, within Langstone Harbour, it is considered that there is no pathway for impact due to the onshore nature of the cable crossing. Outside of Langstone Harbour, the permanent loss of fish and shellfish habitat as a result of cable non-burial protection is not material in terms of its effect on prey availability since these measures will be limited in spatial extent (*c*. 0.7 km^2). During operation, the repair or replacement of cables, although unlikely, may be required. An indicative worst-case failure rate of the Marine Cables could require a repair once every 10-12 years. Cable repair has the potential to have similar or lesser effects as during construction, however, potential increases in SSC would be lower than during construction due to the smaller scale of a repair, the shorter duration of works and the more localised nature of work and no adverse effects will occur as a result these potential works. Therefore, it is considered that potential effects on prey availability resulting from seabed disturbance/loss and increased turbidity from the Proposed Development alone will not result in an adverse effect on site integrity. . Potential effects resulting from plans or projects which have temporal and spatial overlap with the Proposed Development (Table 4 of Appendix 3) are considered to be highly localised and temporary. As such, it is considered that there is no potential for adverse effects on site integrity from disturbance and displacement, either alone or in combination with other project and plans (see Appendix 1 PINS matrices for further details).
			Supporting habitat: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	Red-breasted mergansers are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey. They are considered to be moderately sensitive to habitat disturbance (Bradbury *et al*., 2014). Activities associated with construction, repair and maintenance works have the potential to release sediment into the water column during cable burial and associated works e.g. HDD pit excavation. However, since HDD will be used within Langstone Harbour, with an onshore exit point, the volume of suspended material is considered to be negligible.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					Outside of Langstone Harbour, excavation at the marine HDD pits (KP 1.0-1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations) will transport the finest sediments up to 10 km from the release point. However, SSC at these distances will be low (< 5 mg/l) and therefore not discernible above natural variation, which ranges from approximately <5 to 75 mg/l in coastal areas. Effects on prey species at the Landfall are therefore considered to be not material since both habitat disturbance and increases in SSC will be temporary, short in duration and small in extent. Elsewhere within the Marine Cable Corridor, the area of disturbed habitat for route preparation is anticipated to be a maximum of 3.6 km^2 along the entire Marine Cable Corridor (*c.*6%). High densities of red-breasted merganser are not predicted beyond KP 21 given the species' preference for shallow, coastal waters (Robbins, 2017). Within the nearshore area where densities are likely to be highest (KP 0-21), it is predicted that a peak SSC of up to 200 mg/l may be observed locally (i.e. within 2 km of the cable trench/HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km from the cable trench/HDD pit at which point concentrations of 5 to 10 mg/l are predicted; SSC is expected to return to background levels within a few days following completion of these activities. During operation, repair or replacement of cables, although unlikely, may be required. An indicative worst-case failure rate of the Marine Cables could require a repair once every 10-12 years. Cable repair has the potential to have similar or lesser effects as during construction, however, potential effects from SSC would be lower than during construction due to the smaller scale of a repair, the shorter duration of works and the more localised nature of work. As such, the potential for effects from reduced prey availability resulting from increased turbidity from the Proposed Development alone will not have an adverse effect on site integrity. Potential effects resulting from plans or projects which have temporal and spatial overlap with the Proposed Development (Table 4 of Appendix 3) are considered to be highly localised and temporary. As such, it is concluded that there will be no adverse effect on site integrity from effects on prey species within the water

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					column from increased turbidity, either alone or in combination with other project and plans (see Appendix 1 PINS matrices for further details).
		Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect red-breasted mergansers utilising the sea surface through direct oiling resulting in mortality. Unplanned disposal of industrial or user plastic during all development phases also has the potential to cause red-breasted merganser mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will prevent these events and it is predicted that, in consideration of mitigation measures, there will be no adverse effects on site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is concluded that there will be no adverse effect on site integrity either alone or in combination with other plans and projects (see Appendix 1 PINS matrices for further details).
Little tern	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Disturbance and displacement	Disturbance caused by human activity	Restrict the frequency, duration and/or intensity of disturbance affecting roosting, nesting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed.	Little terns at sea are scored as being of moderate sensitivity to disturbance and therefore displacement (Garthe & Hüppop, 2004; Bradbury *et al*., 2014). Within Langstone and Chichester Harbours, breeding colonies of little tern are present. Given that little terns are known to forage in relatively close proximity to their breeding colonies (Thaxter *et al*., 2012)onshore HDD works within the Langstone Harbour have potential to displace this species during foraging given its moderate sensitivity to disturbance at sea. Of the three onshore HDD locations, HDD3 at Kendall's Wharf is the closest location to a little tern breeding colony, located at a minimum distance of *c*.2 km from the Baker's Island colony. Sheet piling at HDD3 may therefore disturb and displace foraging birds through unpredictable noise events. However, these works will be above MHWS in an already industrialised setting. Vibro-hammering will be very short in duration (two hours for installation at each location) and noise levels from the EMV at HDD3 will be *c*.40 dB at Baker's Island, given that SPLs reduce by 6 dB each time the distance is doubled. Noise and visual disturbance associated with construction activities at HDD3 will not be noticeable above baseline levels of disturbance within Langstone Harbour (Cutts & Allen, 1999; Cutts *et al*., 2009). In any event, were

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					little terns be temporarily disturbed from foraging in proximity to the onshore HDD works within Langstone Harbour, other equivalent foraging sites are present elsewhere in Chichester and Langstone Harbours which will be unaffected by the Proposed Development. Given that HDD1 and HDD2 are located further away from little tern breeding colonies, it is considered that there is no potential for adverse effects from onshore HDD works at these locations, both of which are located above MHWS in an urban environment. Outside of Langstone Harbour, little terns may be present in shallow, nearshore waters at the mouth of Langstone Harbour. There is therefore potential for foraging birds to be disturbed and displaced by both unpredictable noise events and visual disturbance associated with construction activities at the marine HDD location off Eastney. Vibro-hammering at the marine HDD location will be short in duration and noise generated by the vibro-hammers and pipe-driving machine will be non-percussive and airbourne SPLs will not be noticeable above the baseline in this urban setting. Since little terns plunge dive to a maximum of 1 m whilst feeding (RPS, 2011), it is considered that exposure to any underwater noise resulting from the vibro-hammer and pipe driving machines will be minimal and not discernible above background underwater noise levels (median noise levels around the UK range from 81.5 to 95.5 dB re 1 μPa; Merchant *et al*., 2016). A single jack-up vessel, together with a multicat, a safety vessel, a crew transfer vessel and up to four workboats may be present at the marine HDD location for up to 44 weeks, with a total of 636 vessel movements predicted over this period. The potential grounding of cable lay barges at low tide between KP 1.0 and KP 4.7 will occur over a short duration of up to 4 weeks. This is will not be noticeable above baseline levels of disturbance from the existing high levels of traffic within the area. Given that the foraging range of little tern is restricted to nearshore waters up to *c*.10 km (Thaxter *et al*., 2012; Parsons *et al.,* 2015), construction activities beyond this range will impact this feature. However, it is anticipated that there may be up to c.825 vessel movements over the course of the construction stage throughout the Marine Cable Corridor, including at the marine HDD location, over the anticipated 30-month 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. Whilst

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					there may be a number of vessels present during each stage of installation, it is likely that each vessel will only be present in any one area of the rolling safe passage distance for very short durations (hours to days). Furthermore, vessel traffic levels in the Channel and Solent are already high. As such, little terns which use the Marine Cable Corridor to forage will be habituated to such levels of disturbance. Therefore, potential disturbance and displacement effects from the Proposed Development alone will not result in an adverse effect on little tern as a qualifying feature of this SPA, and there will be no adverse effect on site integrity. Potential effects resulting from plans or projects which have temporal and spatial overlap with the Proposed Development (Table 4 of Appendix 3) are considered to be highly localised and temporary. As such, it is considered that there will be no adverse effect on site integrity from disturbance and displacement, either alone or in combination with other project and plans (see Appendix 1 and Appendix 5 PINS matrices for further details).
		Indirect effects	Supporting habitat: food availability	Maintain the distribution, abundance and availability of key food and prey items (e.g. crustacea, annelids, sandeel, herring, clupeidae) at preferred sizes.	Little terns are effectively top predators of benthos, fish and shellfish populations and are considered likely to be of moderate sensitivity to habitat disturbance (Garthe & Hüppop, 2004; Bradbury *et al*., 2014). If seabed habitats (and therefore the prey species) are disturbed, the area may be temporarily devoid of any potential food sources, resulting in effective habitat loss. Furthermore, terns are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey from the sea surface. Activities associated with construction have the potential to release sediment into the water column during cable burial and associated works. Within Langstone Harbour where foraging little tern numbers may be high; HDD will be used. The entry/exit points of the drill are expected to be onshore, thus there is no pathway for the works to result in an increase in suspended sediment or resultant smothering. Therefore, the works are considered to have no material effect on tern prey species in Langstone Harbour. Outside of Langstone Harbour, excavation at the marine HDD pits (KP 1.0-1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations) will transport the finest sediments up to 10 km from the release point. However, SSC at these distances will be low (< 5 mg/l) and therefore not

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					discernible above natural variation, which ranges from approximately <5 to 75 mg/l in coastal areas. Effects on prey species at the Landfall are therefore considered not material since both habitat disturbance and increases in SSC will be temporary, short in duration and small in extent. Elsewhere within the UK Marine Cable Corridor, where foraging little tern densities are likely to be much lower (Parsons *et al*., 2015), the area of disturbed habitat for route preparation is anticipated to be a maximum of 3.6 km^2 along the entire UK Marine Cable Corridor (*c*.6%). Breeding little tern are not expected to be present beyond KP 21 given their mean-maximum foraging range (6.3 km ± 2.4 km; Thaxter *et al*., 2012). Within this nearshore area (KP 0 – 21), it is predicted that a peak SSC of up to 200 mg/l may be observed locally (i.e. within 2 km of the cable trench/HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km from the cable trench/HDD pit at which point concentrations of 5 to 10 mg/l are predicted; SSC is expected to return to background levels within a few days following completion of these activities. Most prey species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, together with high background levels of suspended sediment in the Solent already (Guillou, *et al*., 2017). During operation, within Langstone Harbour, it is considered that there is no pathway for impact due to the onshore nature of the cable crossing. Outside of Langstone Harbour during operation, the permanent loss of fish, shellfish and benthic habitat as a result of cable non-burial protection would have no adverse effect effect on prey availability since these measures will be limited in spatial extent (*c*.0.7 km^2). During operation, the repair or replacement of cables, although unlikely, may be required. An indicative worst-case failure rate of the Marine Cables could require a repair once every 10-12 years. Cable repair has the potential to have similar or lesser effects as during construction, however, potential increases in SSC would be lower than during construction due to the smaller scale of a repair, the shorter duration of works and the more localised nature of work. As such, the potential for effects from reduced prey availability resulting from seabed disturbance/loss and increased turbidity

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					from the Proposed Development alone will not adversely affect little tern, and there will be no adverse effects on site integrity. Potential effects resulting from plans or projects which have temporal and spatial overlap with the Proposed Development (Table 4 of Appendix 3) are considered to be highly localised and temporary. As such, it is considered that there is no potential for adverse effects on site integrity from effects on prey availability, either alone or in combination with other project and plans (see Appendix 1 and Appendix 5 PINS matrices for further details).
			Supporting habitat: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	Little terns are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey. They are considered to be moderately sensitive to habitat disturbance (Bradbury *et al*., 2014). Activities associated with construction, repair and maintenance works have the potential to release sediment into the water column during cable installation and associated works e.g. HDD pit excavation. However, since HDD will be used within Langstone Harbour, with an onshore exit point, the volume of suspended material is considered to be negligible. Outside of Langstone Harbour, excavation at the marine HDD pits (KP 1.0-1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations) will transport the finest sediments up to 10 km from the release point. However, SSC at these distances will be low (< 5 mg/l) and therefore not discernible above natural variation, which ranges from approximately <5 to 75 mg/l in coastal areas. There would be no adverse effects on the availability of prey species at the Landfall since both habitat disturbance and increases in SSC will be temporary, short in duration and small in extent. Elsewhere within the Marine Cable Corridor, where foraging little tern densities are likely to be much lower (Parsons *et al*., 2015), the area of disturbed habitat for route preparation is anticipated to be a maximum of 3.6 km^2 along the entire Marine Cable Corridor (*c*.6%). Breeding little tern are not expected to be present beyond KP 21, given their mean-maximum foraging range (6.3 km ± 2.4 km; Thaxter *et al*., 2012). Within this nearshore area (KP 0 – 21), it is predicted that a peak SSC of up to 200 mg/l may be observed locally (i.e. within 2 km of the cable trench/HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km from the

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					cable trench/HDD pit at which point concentrations of 5 to 10 mg/l are predicted; SSC is expected to return to background levels within a few days following completion of these activities. During operation, the repair or replacement of cables, although unlikely, may be required. An indicative worst-case failure rate of the Marine Cables could require a repair once every 10-12 years. Cable repair has the potential to have similar or lesser effects as during construction, however, potential increases in SSC would be lower than during construction due to the smaller scale of a repair, the shorter duration of works and the more localised focus of work, with no adverse effects on site integrity. As such, the potential for effects from reduced prey availability resulting from increased turbidity from the Proposed Development alone is concluded not to result in an adverse effect on site integrity. Potential effects resulting from plans or projects which have temporal and spatial overlap with the Proposed Development (Table 4 of Appendix 3) are considered to be highly localised and temporary. As such, it is considered that there are no adverse effects on site integrity from effects on prey species within the water column, either alone or in combination with other project and plans (see Appendix 1 and Appendix 5 PINS matrices for further details).
		Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect little terns utilising the sea surface through direct oiling resulting in mortality. Unplanned disposal of industrial or user plastic during all development phases also has the potential to cause little tern mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will prevent these events occurring and therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effect on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					combination with other plans and projects (see Appendix 1 and Appendix 5 PINS matrices for further details).
Sandwich tern	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Indirect effects	Supporting habitat: food availability	Maintain the distribution, abundance and availability of key food and prey items (e.g. crustacea, annelids, sandeel, herring, clupeidae) at preferred sizes.	Sandwich terns are effectively top predators of benthos, fish and shellfish populations and are considered likely to be of moderate sensitivity to habitat disturbance (Garthe & Hüppop, 2004; Bradbury *et al*., 2014). If seabed habitats (and therefore the prey species) are disturbed, the area may be temporarily devoid of any potential food sources, resulting in effective habitat loss. Furthermore, terns are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey from the sea surface. Activities associated with construction have the potential to release sediment into the water column during cable burial and associated works. Within Langstone Harbour, HDD will be used. The entry/exit points of the drill are expected to be onshore, thus there is no pathway for the works to result in an increase in suspended sediment or resultant smothering. Therefore, the works will not adversely affect tern prey species in Langstone Harbour. Outside of Langstone Harbour, excavation at the marine HDD pits (KP 1.0-1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations) will transport the finest sediments up to 10 km from the release point. However, SSC at these distances will be low (< 5 mg/l) and therefore not discernible above natural variation, which ranges from approximately <5 to 75 mg/l in coastal areas. There will be no adverse effects on the availability of prey species at the Landfall since both habitat disturbance and increases in SSC will be temporary, short in duration and small in extent. Elsewhere within the Marine Cable Corridor, where foraging Sandwich tern densities may be lower (Wilson *et al*., 2014), the area of disturbed habitat for route preparation is anticipated to be a maximum of 3.6 km^2 along the entire Marine Cable Corridor (*c*.6%). Based on the predicted usage distributions presented in Wilson *et al*., (2014), high densities of breeding Sandwich terns are not expected beyond KP 21. Within the area of highest use (KP 0-21), it is predicted that a peak SSC of up to 200 mg/l may be observed locally (i.e. within 2 km of the cable trench/HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km from the cable trench/HDD pit at which point concentrations of 5 to 10 mg/l are predicted; SSC is expected to return to background

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					levels within a few days following completion of these activities. Most prey species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, together with high background levels of suspended sediment in the Solent already (Guillou, *et al*., 2017). During operation, within Langstone Harbour, it is considered that there is no pathway for impact due to the onshore nature of the cable crossing. Outside of Langstone Harbour during operation, the permanent loss of fish, shellfish and benthic habitat as a result of cable non-burial protection will not materially affect the prey availability since these measures will be limited in spatial extent (*c*.0.7 km^2). During operation, the repair or replacement of cables, although unlikely, may be required. An indicative worst-case failure rate of the Marine Cables could require a repair once every 10-12 years. Cable repair has the potential to have similar or lesser effects as during construction, however, potential increases in SSC would be lower than during construction due to the smaller scale of a repair, the shorter duration of works and the more localised nature of work, with no adverse effects on site integrity. As such, the potential for effects from reduced prey availability resulting from seabed disturbance/loss and increased turbidity from the Proposed Development alone is concluded not to result in any adverse effect on site integrity. Potential effects resulting from plans or projects which have temporal and spatial overlap with the Proposed Development (Table 4 of Appendix 3) are considered to be highly localised and temporary. As such, it is considered that there are no adverse effects on site integrity from in combination effects on prey availability, either alone or in combination with other project and plans (see Appendix 1 PINS matrices for further details).
			Supporting habitat: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	Sandwich terns are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey. They are considered to be moderately sensitive to habitat disturbance (Bradbury *et al*., 2014). Activities associated with construction, repair and maintenance works have the potential to release sediment into the water column during cable installation and associated works. However, since HDD will be used within Langstone Harbour, with an

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					onshore exit point, the volume of suspended material is considered to be negligible. Outside of Langstone Harbour, excavation at the marine HDD pits (KP 1.0-1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations) will transport the finest sediments up to 10 km from the release point. However, SSC at these distances will be low (< 5 mg/l) and therefore not discernible above natural variation, which ranges from approximately <5 to 75 mg/l in coastal areas. There will be no adverse effects on the availability of prey species at the Landfall since both habitat disturbance and increases in SSC will be temporary, short in duration and small in extent. Elsewhere within the Marine Cable Corridor, where foraging Sandwich tern densities may be lower (Wilson *et al*., 2014), the area of disturbed habitat for route preparation is anticipated to be a maximum of 3.6 km^2 along the entire Marine Cable Corridor (c.6%). Based on the predicted usage distributions presented in Wilson *et al*., (2014), high densities of breeding Sandwich terns are not expected beyond KP 21. Within the area of highest use (KP 0-21), it is predicted that a peak SSC of up to 200 mg/l may be observed locally (i.e. within 2 km of the cable trench/HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km from the cable trench/HDD pit at which point concentrations of 5 to 10 mg/l are predicted; SSC is expected to return to background levels within a few days following completion of these activities. During operation, the repair or replacement of cables, although unlikely, may be required. An indicative worst-case failure rate of the Marine Cables could require a repair once every 10-12 years. Cable repair has the potential to have similar or lesser effects as during construction, however, potential increases in SSC would be lower than during construction due to the smaller scale of a repair, the shorter duration of works and the more localised nature of work, with no adverse effect on site integrity. As such, the potential for effects from reduced prey availability resulting from increased turbidity from the Proposed Development alone is concluded not to result in any adverse effects on site integrity. Potential effects resulting from plans or projects which have temporal and spatial overlap with the Proposed Development

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					(Table 4 of Appendix 3) are considered to be highly localised and temporary. As such, it is considered that there are no adverse effects on site integrity from effects on prey species within the water column, either alone or in combination with other project and plans (see Appendix 1 PINS matrices for further details).
		Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect Sandwich terns utilising the sea surface through direct oiling resulting in mortality. Unplanned disposal of industrial or user plastic during all development phases also has the potential to cause Sandwich tern mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will preventthese events occurring and therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effects on site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Common tern	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Indirect effects	Supporting habitat: food availability	Maintain the distribution, abundance and availability of key food and prey items (e.g. crustacea, annelids, sandeel, herring, clupeidae) at preferred sizes.	Common terns are effectively top predators of benthos, fish and shellfish populations and are considered likely to be of moderate sensitivity to habitat disturbance (Garthe & Hüppop, 2004; Bradbury *et al*., 2014). If seabed habitats (and therefore the prey species) are disturbed, the area may be temporarily devoid of any potential food sources, resulting in effective habitat loss. Furthermore, terns are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey from the sea surface. Activities associated with construction have the potential to release sediment into the water column during cable installation and associated works e.g. HDD pit excavation. Within Langstone Harbour, HDD will be used. The entry/exit points of the drill are expected to be onshore, thus there is no pathway for the works to result in an increase in suspended sediment or resultant smothering. Therefore, the works will not adversely affect tern prey species in Langstone Harbour. Outside of Langstone Harbour, excavation at the marine HDD pits (KP 1.0-1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					and 15, and in other isolated locations) will transport the finest sediments up to 10 km from the release point. However, SSC at these distances will be low (< 5 mg/l) and therefore not discernible above natural variation, which ranges from approximately <5 to 75 mg/l in coastal areas. There will be no adverse effects on prey species at the Landfall since both habitat disturbance and increases in SSC will be temporary, short in duration and small in extent. Elsewhere within the Marine Cable Corridor, where foraging common tern densities may be lower (Wilson *et al*., 2014), the area of disturbed habitat for route preparation is anticipated to be a maximum of 3.6 km^2 along the entire Marine Cable Corridor (*c*.6%). Breeding common tern are not expected to be present beyond KP 21 in high densities, given their mean-maximum foraging range (15.2 km ± 11.2 km; Thaxter *et al*., 2012). Within this nearshore area (KP 0 – 21), It is predicted that a peak SSC of up to 200 mg/l may be observed locally (i.e. within 2 km of the cable trench/HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km from the cable trench/HDD pit at which point concentrations of 5 to 10 mg/l are predicted; SSC is expected to return to background levels within a few days following completion of these activities. Most prey species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, together with high background levels of suspended sediment in the Solent already (Guillou, *et al*., 2017). During operation, within Langstone Harbour, it is considered that there is no pathway for impact due to the onshore nature of the cable crossing. Outside of Langstone Harbour during operation, there will be no adverse effect on prey availability since these measures will be limited in spatial extent (*c*.0.7 km^2). During operation, the repair or replacement of cables, although unlikely, may be required. An indicative worst-case failure rate of the Marine Cables could require a repair once every 10-12 years. Cable repair has the potential to have similar effects as during construction. However, potential increases in SSC would be lower than during construction due to the smaller scale of a repair, the shorter duration of works and the more localised nature of work, with no adverse effect on site integrity.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					As such, the potential for effect from reduced prey availability resulting from seabed disturbance/loss and increased turbidity from the Proposed Development alone is concluded to not result in any adverse effect on site integrity. Potential effects resulting from plans or projects which have temporal and spatial overlap with the Proposed Development (Table 4 of Appendix 3) are considered to be highly localised and temporary. As such, it is concluded that there are no adverse effects on site integrity from effects on prey availability, either alone or in combination with other project and plans (see Appendix 1 PINS matrices for further details).
			Supporting habitat: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	Common terns are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey. They are considered to be moderately sensitive to habitat disturbance (Bradbury *et al*., 2014). Activities associated with construction, repair and maintenance works have the potential to release sediment into the water column during cable burial and associated works. However, since HDD will be used within Langstone Harbour, with an onshore exit point, the volume of suspended material is considered to be negligible. Outside of Langstone Harbour, excavation at the marine HDD pits (KP 1.0-1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations) will transport the finest sediments up to 10 km from the release point. However, SSC at these distances will be low (< 5 mg/l) and therefore not discernible above natural variation, which ranges from approximately <5 to 75 mg/l in coastal areas. There will be no adverse on prey species availability the Landfall since both habitat disturbance and increases in SSC will be temporary, short in duration and small in extent. Elsewhere within the Marine Cable Corridor, where foraging common tern densities may be lower (Wilson *et al*., 2014), the area of disturbed habitat for route preparation is anticipated to be a maximum of 3.6 km^2 along the entire Marine Cable Corridor (*c*.6%). Breeding common tern are not expected to be present beyond KP 21 in high densities, given their mean-maximum foraging range (15.2 km ± 11.2 km; Thaxter *et al*., 2012). Within this nearshore area (KP 0 – 21), it is predicted that a peak SSC of up to 200 mg/l may be observed locally (i.e. within 2 km of the cable trench/HDD pit) and these concentrations could potentially persist for several hours

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km from the cable trench/HDD pit at which point concentrations of 5 to 10 mg/l are predicted; SSC is expected to return to background levels within a few days following completion of these activities. During operation, the repair or replacement of cables, although unlikely, may be required. An indicative worst-case failure rate of the Marine Cables could require a repair once every 10-12 years. Cable repair has the potential to have similar effects as during construction, however, potential increases in SSC would be lower than during construction due to the smaller scale of a repair, the shorter duration of works and the more localised nature of work, with no adverse effects on site integrity. As such, the potential for effects from reduced prey availability resulting from increased turbidity from the Proposed Development alone will not result in any adverse effect on site integrity. Potential effects resulting from plans or projects which have temporal and spatial overlap with the Proposed Development (Table 4 of Appendix 3) are considered to be highly localised and temporary. As such, it is predicted that there will be no adverse effect on site integrity from effects to prey species within the water column, either alone or in combination with other project and plans (see Appendix 1 PINS matrices for further details).
		Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect common terns utilising the sea surface through direct oiling resulting in mortality. Unplanned disposal of industrial or user plastic during all development phases also has the potential to cause common tern mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will prevent these events occurring and therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effects on site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Supporting habitat (water column)	Maintaining or restoring the extent, distribution, structure, function and supporting processes of the habitats of the qualifying features	Indirect effects	Supporting habitat: water quality - DO	Maintain the DO concentration at levels equating to High Ecological Status (specifically ≥ 5.7 mg per litre (at 35 salinity) for 95 % of the year), avoiding deterioration from existing levels.	DO levels affect the condition and health of supporting habitats. High turbidity can lead to a drop in DO, especially in warmer months. Low DO can have sub-lethal and lethal impacts on key prey species (Best *et al*., 2007) and hence can adversely affect the availability and suitability of qualifying feature feeding habitat. Activities associated with construction, repair and maintenance works have the potential to release sediment and increase turbidity during cable installation and associated works. However, since HDD will be used within Langstone Harbour, with an onshore exit point, the volume of suspended material is considered to be negligible. Outside of Langstone Harbour, excavation at the marine HDD pits (KP 1.0-1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations) will transport the finest sediments up to 10 km from the release point. However, SSC at these distances will be low (< 5 mg/l) and therefore not discernible above natural variation, which ranges from approximately <5 to 75 mg/l in coastal areas. Elsewhere within the Marine Cable Corridor, the area of disturbed habitat for route preparation is anticipated to be a maximum of 3.6 km^2 along the entire Marine Cable Corridor (*c*.6%). It is predicted that a peak SSC of up to 200 mg/l may be observed locally (i.e. within 2 km of the cable trench/HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km from the cable trench/HDD pit at which point concentrations of 5 to 10 mg/l are predicted; SSC is expected to return to background levels within a few days following completion of these activities. During operation, the repair or replacement of cables, although unlikely, may be required. An indicative worst-case failure rate of the Marine Cables could require a repair once every 10-12 years. Cable repair has the potential to have similar or lesser effects as during construction. However, potential increases in SSC would be lower than during construction due to the smaller scale of a repair, the shorter duration of works and the more localised nature of work, with no adverse effect on site integrity. As such, the potential for effect on key prey species within the water column resulting from a drop in DO from the Proposed

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					Development alone will not result in any adverse effects on site integrity. Potential effects resulting from plans or projects which have temporal and spatial overlap with the Proposed Development (Table 4 of Appendix 3) are considered to be highly localised and temporary. As such, it is concluded that there will be no adverse effect on site integrity from effects on prey availability from a drop in DO, either alone or in combination with other project and plans (see Appendix 1 PINS matrices for further details).
			Supporting habitat: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	A prolonged increase in turbidity through sediment release has a number of potential implications for prey species in the water column, such as affecting fish health and clogging the filtering organs of suspension feeding animals. This in turn can adversely affect the availability and suitability of qualifying feature feeding habitat. Activities associated with construction, repair and maintenance works have the potential to release sediment and increase turbidity during cable installation and associated works. However, since HDD will be used within Langstone Harbour, with an onshore exit point, the volume of suspended material is considered to be negligible. Outside of Langstone Harbour, excavation at the marine HDD pits (KP 1.0-1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations) will transport the finest sediments up to 10 km from the release point. However, SSC at these distances will be low (< 5 mg/l) and therefore not discernible above natural variation, which ranges from approximately <5 to 75 mg/l in coastal areas. There will be no adverse effects on the availability of prey species at the Landfall since both habitat disturbance and increases in SSC will be temporary, short in duration and small in extent. Elsewhere within the Marine Cable Corridor, the area of disturbed habitat for route preparation is anticipated to be a maximum of 3.6 km^2 along the entire Marine Cable Corridor (*c*.6%). It is predicted that a peak SSC of up to 200 mg/l may be observed locally (i.e. within 2 km of the cable trench/HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km from the cable trench/HDD pit at which point concentrations of 5 to 10 mg/l are predicted; SSC is expected to return to

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					background levels within a few days following completion of these activities. During operation, the repair or replacement of cables, although unlikely, may be required. An indicative worst-case failure rate of the Marine Cables could require a repair once every 10-12 years. Cable repair has the potential to have similar or lesser effects as during construction. However, potential increases in SSC would be lower than during construction due to the smaller scale of a repair, the shorter duration of works and the more localised nature of work, resulting in no adverse effects on site integrity. As such, the potential for effect from increased turbidity from the Proposed Development alone is concluded not to result in any adverse effect on site integrity. Potential effects resulting from plans or projects which have temporal and spatial overlap with the Proposed Development (Table 4 of Appendix 3) are considered to be highly localised and temporary. As such, it is considered that there will be no adverse effects on site integrity from effects of increased turbidity, either alone or in combination with other project and plans (see Appendix 1 PINS matrices for further details).
		Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect prey species within the water column through a range of biological effects. Unplanned disposal of industrial or user plastic during all development phases also has the potential to affect prey species through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will preventthese events occurring therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Conclusion: No adverse effect on site integrity can be concluded, either from the Proposed Development alone, or in combination with other plans or projects, for the Chichester and Langstone Harbours SPA/Ramsar site.					

Table 10.4- Onshore assessment of potential adverse effects on site integrity for the Chichester and Langstone Harbours SPA/Ramsar site across all phases of the Proposed Development both alone and in combination with other plans or projects

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Sandwich tern	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex V of the Water Framework Directive, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages may occur during the construction and decommissioning phases. Spills have the potential to directly affect Sandwich tern utilising the SPA and other supporting habitats resulting in mortality. Unplanned disposal of industrial or user plastic during construction and decommissioning also has the potential to cause Sandwich tern mortality through ingestion or entanglement However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and Material Resources of the ES, APP-142)) will ensure that these events are prevented and will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline Construction Environmental Management Plan (CEMP) (APP-505 Rev 004) and detail incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP'. The key matters of the SWMP are to: • 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. Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailed CEMP specific to the works to be undertaken and agreed with relevant authority prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater (APP-134) and further captured in the Onshore Outline CEMP (APP-505 Rev004) 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;

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					• Use of drip trays under mobile plant; and • Drain socks to trap sediment entering the watercourse. Therefore, it is considered that potential effects on Sandwich tern resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) are considered to be localised and temporary. Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (for full details see Appendix 1 for the screening and integrity matrices for the SPA and Appendix 5 for the Ramsar site).
Little tern	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex V of the Water Framework Directive, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages may occur during the construction and decommissioning phases. Spills have the potential to directly affect little tern utilising the SPA and other supporting habitats resulting in mortality. Unplanned disposal of industrial or user plastic during construction and decommissioning also has the potential to cause little tern mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and Material Resources of the ES, APP-142) will ensure that these events are prevented and will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505 Rev004) and detail incorporating a Materials Management Plan (‘MMP’) and Site Waste Management Plan (‘SWMP’). The key matters of the SWMP are to: • 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.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailed CEMP specific to the works to be undertaken and agreed with relevant authority prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater (APP-134) and further captured in the Onshore Outline CEMP (APP-505 Rev004) 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. Therefore, it is considered that potential effects on little tern resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424)) are considered to be localised and, temporary. Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (for full details see Appendix 1 for the screening and integrity matrices for the SPA).
Common tern	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex V of the Water Framework Directive, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages may occur during the construction and decommissioning phases. Spills have the potential to directly affect common tern utilising the SPA and other supporting habitats resulting in mortality. Unplanned disposal of industrial or user plastic during construction and decommissioning also has the potential to cause common tern mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and Material Resources of the ES, APP-142) will ensure that these events are prevented and will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505 Rev004) and detail incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP'). The key matters of the SWMP are to: • 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;

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					• 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. Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailed CEMP specific to the works to be undertaken and agreed with relevant authority prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater (APP-134) and further captured in the Onshore Outline CEMP (APP-505 Rev004) 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. Therefore, it is considered that potential effects on common tern resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424)) are considered to be localised and temporary. Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (for full details see Appendix 1 for the screening and integrity matrices for the SPA).
Dark-bellied brent goose	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Disturbance and displacement	Disturbance caused by human activity	Reduce the frequency, duration and/or intensity of disturbance affecting roosting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed.	Dark-bellied brent goose is considered to be of high sensitivity to disturbance (Cutts *et al.*, 2013). Therefore, 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 dark-bellied brent geese at both roosting and foraging components of their daily cycle despite the industrial setting of the Proposed Development (SWBGS Steering Group, 2018). Owens (1977) describes the effects of anthropogenic disturbances on Brent Geese wintering on the Essex coast near the site of the then proposed London Airport at Maplin Sands. The report concluded that brent geese quickly became habituated to most sounds, but unexpected sounds, such as nearby gunshots from wildfowlers, usually put the geese to flight. Similarly, the first shots of the

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					day at nearby army gunnery ranges caused the birds to leave the area, but they quickly returned and ignored all subsequent firings for that day. Extremely loud but regular bangs made during nearby weapon testing caused little reaction after the first few weeks. Specific surveys for this species for the Proposed Development recorded notable numbers in both intertidal and terrestrial (i.e. SWBGS) components of the Study Area (APP-421). Furthermore, given the proximity of these areas to the Proposed Development, construction and decommissioning works are considered to have the potential to displace wintering dark-bellied brent goose from favoured foraging and roosting habitat through unpredictable noise events. Construction work within the SWBGS sites will reduce the availability of grassland foraging habitat where the construction stage overlaps with the winter season when dark-bellied brent geese and other wintering birds that are qualifying features of the SPA are present, nominally October to March (Carboneras *et al.* 2019). Work within the sites during winter would produce direct disturbance of the sites from noise and movements of construction vehicles and machinery, further restricting the availability of remaining grassland within the sites as foraging areas. The following SWBGS sites overlap with onshore components of the Proposed Development: • 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 Effects of the construction stage on Chichester and Langstone Harbour SPA and it's wintering intertidal bird community will be avoided by restricting works within the winter season, defined as October to March (the period when SPA qualifying species such as dark-bellied brent goose arrive from their breeding grounds (Snow and Perrins, 1998). A detailed overview of the working restrictions was provided in Chapter 16: Onshore Ecology (APP-131) and Appendix 16.14: Winter Working Restriction for Features of Chichester & Langstone Harbours SPA (APP-422) and then subject to revisions following consultation with Natural England which are captured in the updated Outline Onshore Construction Environmental Monitoring Plan (OOCEMP; APP-505 Rev004). There are six principles that will be incorporated into working methods:

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					• **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 Proposed Developments Order Limits during October – March. An exception is the gravel car park within site P11 that is 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 Harbour 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 dBLAmax 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 Proposed Development 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 69dbLAmax – 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). Adoption of Principle 1 (and reference to Principle 2) will ensure that there are no adverse effects on those SWBGS sites that lie within the Order Limits as detailed above (as these sites will not be subject to works in the winter period when they are used by SPA birds), and effects of noise, vibration and visual disturbance on birds within the SPA itself. Trenching / road saw noise at 69dbLAmax has the potential to affect fourteen SWBGS sites. However, SWBGS sites P54 and P29 will not be adversely affected due to the minimal overlap of the site areas with noise exceeding 69 dB from trenching / road saw works. It is also considered that the buildings that are situated between the construction works and SWBGS sites will effectively buffer the noise so that in reality, there will be no overlap of noise effects. In consequence, these two sites are excluded from the restriction. In relation to the remaining 12 sites in addition to adjacent areas of the SPA, although it is considered likely that Principle 5 applies in this highly urbanised environment, construction work is restricted during October – March.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					The percussive activities at HDD compounds in proximity to the SWBGS sites are anticipated to comprise the insertion of sheet piles via an excavator mounted vibrator at HDD-1, HDD-2, HDD-3 and HDD-6 and via a piling rig for the reception pit at HDD-4. In accordance with the requirements of the OOCEMP, screening of at least 2 m high around the perimeter of the HDD compounds is required for the purpose of noise mitigation. Example screening solutions are presented in plate 6.1 of the OOCEMP (APP-505 Rev004). The benefit this screening affords has been included in 3D noise modelling for the HDD works in proximity to the SWBGS sites. Construction noise at over 69db LAmax as a result of this screening only occurs outside of the compounds for HDD-4 and HDD-6. The SPA is in an urban setting and recent research has established that visual disturbance does not have a significant impact on waterbirds in an estuary close to conurbations (Goss-Custard *et al*., 2019). The screening at the perimeter of HDD compounds will however also reduce visual disturbance to indistinguishable levels regardless of the baseline environment. With the combination of the seasonal restriction and mitigation measures the potential effects on dark-bellied brent goose resulting from disturbance and displacement from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) are considered to be localised and temporary. The North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL) includes a full winter working restriction (October – March) so will not disturb dark-bellied brent goose. Such restrictions have been adopted by other plans or projects 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). Potential overlap between the Proposed Development Order Limits and mitigation areas for the North Portsea Island Coastal Flood Defence Scheme Phase 4b would occur if the Proposed Developments southern route option around Milton Common is taken. However, those compensation measures do not form part of the proposed mitigations/compensations to be provided in connection with the planning permission with reference 19/01368/FUL as per the most recent documents submitted to discharge the relevant planning conditions. As such, it is considered that there is no potential for adverse effects on site integrity from disturbance and displacement, either alone or in combination with other project and plans (for full details see Appendix 1 for the screening and integrity matrices for the SPA and Appendix 5 for the Ramsar site).

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
		Accidental spills and Litter	Supporting habitat: food availability	Maintain the distribution, abundance and availability of key food and prey items e.g. *Zostera*, *Ulva spp.*, *Spergularia, Puccinellia, Triglochin, Aster trifolium, Plantago, Salicornia spp, Agrostis stolonifera, Lolium perenne, Trifolium repens*) at preferred sizes.	Unplanned oil or chemical spillages may occur during the construction and decommissioning phases. Spills have the potential to directly affect dark-bellied brent geese utilising intertidal and other supporting habitats resulting in mortality. Unplanned disposal of industrial or user plastic during construction and decommissioning phases also has the potential to cause dark-bellied brent goose mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and Material Resources of the ES APP-142)) will ensure that these events are prevented and will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505 Rev004) and detail incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP'). The key matters of the SWMP are to: • 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. Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailed CEMP specific to the works to be undertaken and agreed with relevant authority prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater (APP-134) and further captured in the Onshore Outline CEMP (APP-505 Rev004) 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. Therefore, it is considered that potential effects on dark-bellied brent goose resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) plus the North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL), are considered to be localised and temporary. Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (for full details see Appendix 1 for the screening and integrity matrices for the SPA and Appendix 5 for the Ramsar site).
Redshank	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Disturbance and displacement	Disturbance caused by human activity	Reduce the frequency, duration and/or intensity of disturbance affecting roosting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed.	Redshank is considered to be of high sensitivity to disturbance (Cutts *et al*., 2013). Therefore, the presence of construction associated with HDD works in Langstone Harbour may disturb redshank at both roosting and foraging components of their daily cycle. This species was recorded on a monthly basis in intertidal areas of the Study Area, most during low tide surveys (APP-421). Furthermore, given the proximity of these areas to the Proposed Development, it is considered that construction and decommissioning works may displace wintering redshank from favoured foraging and roosting habitat through unpredictable noise events. However, the Proposed Development is within an industrialised setting so that any noise effects would not add to baseline conditions. Other than where HDD routes underlie the SPA, the Order Limits do not coincide with the SPA itself. Furthermore, effects of the construction stage on Chichester and Langstone Harbour SPA and its wintering intertidal bird community will be avoided by restricting works within the winter season, defined as October to March (the period when SPA birds such as redshank arrive from their breeding grounds (Snow and Perrins, 1998). A detailed overview of the working restriction was provided in Chapter 16: Onshore Ecology (APP-131) and Appendix 16.14: Winter Working Restriction for features of Chichester & Langstone Harbours SPA (APP-422) and then subject to revision following consultation with Natural England which are captured in the updated Outline Onshore Construction Environmental Monitoring Plan (OOCEMP; APP-505 Rev004). Redshank was recorded in intertidal habitat only during the surveys undertaken for the Proposed Development. Therefore Principles 3– 6 apply to this species: • **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.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					• **Principle 5:** Construction works of 55 – 72 dBLAmax immediately adjacent to a major road and/or adjacent to industrial sites with notable levels (>60 dB) of existing noise can be undertaken unrestricted. It is considered that noise levels from the Proposed Development 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 69dbLAmax – 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). Adoption of these principles will ensure that there are no adverse effects from noise, vibration and visual disturbance on redshank within the SPA. Noise effects from both trenching / road saw and HDD works overlaps at 69dbLAmax is extremely limited with regards to intertidal habitat. Trenching / road saw construction is restricted along Eastern Road because of overlap with SWBGS sites so this section will also not provide any disturbance to adjacent intertidal habitat within the SPA. The only other section of the route that is restricted by Principle 6 is the section of the Onshore Cable Route from Milton Locks north to the P23B SWBGS. These aspects are captured in the revised OOCEMP (APP-505 Rev004). In accordance with the requirements of the OOCEMP, screening of at least 2 m high around the perimeter of the HDD compounds is required for the purpose of noise mitigation. Example screening solutions are presented in plate 6.1 of the OOCEMP (APP-505 Rev004). The benefit this screening affords has been included in 3D noise modelling for the HDD works in proximity to the SWBGS sites. Construction noise at over 69db LAmax as a result of this screening only occurs outside of the compounds for HDD-4 and HDD-6. The SPA is in an urban setting and recent research has established that visual disturbance does not have a significant impact on waterbirds in an estuary close to conurbations (Goss-Custard *et al*., 2019). The screening at the perimeter of HDD compounds will however also reduce visual disturbance to indistinguishable levels regardless of the baseline environment. Therefore, it is considered that potential effects on redshank resulting from disturbance and displacement from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) are considered to be localised and temporary. The North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL) includes a full winter working restriction (October – March) so will not disturb

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					redshank. Such restrictions have been adopted by other plans or projects 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). Potential overlap between the Proposed Development Order Limits and mitigation areas for the North Portsea Island Coastal Flood Defence Scheme Phase 4b would occur if the Proposed Developments southern route option around Milton Common is taken. However, those compensation measures do not form part of the proposed mitigations/compensations to be provided in connection with the planning permission with reference 19/01368/FUL as per the most recent documents submitted to discharge the relevant planning conditions. As such, it is considered that there is no potential for adverse effects on site integrity from disturbance and displacement, either alone or in combination with other project and plans (for full details see Appendix 1 for the screening and integrity matrices for the SPA and Appendix 5 for the Ramsar site).
		Accidental spills and Litter	Supporting habitat: food availability	Maintain the distribution, abundance and availability of key food and prey items e.g. earthworm, leatherjacket, grassland/marsh invertebrates, *Hydrobia, Macoma, Corophium, Nereis*) at preferred sizes.	Unplanned oil or chemical spillages may occur during the construction and decommissioning phases. Spills have the potential to directly affect redshank utilising intertidal and other supporting habitats resulting in mortality. Unplanned disposal of industrial or user plastic during construction and decommissioning phases also has the potential to cause redshank mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and Material Resources of the ES APP-142)) will ensure that these events are prevented and will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505 Rev004) and detail incorporating a Materials Management Plan (‘MMP’) and Site Waste Management Plan (‘SWMP’). The key matters of the SWMP are to: • 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. Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailed CEMP specific to the works to be undertaken

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					and agreed with relevant statutory authority prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater (APP-134) and further captured in the Onshore Outline CEMP (APP-505 Rev004) 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. Therefore, it is considered that potential effects on redshank resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) plus the North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL), are considered to be localised and temporary. Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (see Appendix 1 for the screening and integrity matrices for the SPA and Appendix 5 for the Ramsar site).
Shelduck	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Disturbance and displacement	Disturbance caused by human activity	Reduce the frequency, duration and/or intensity of disturbance affecting roosting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed.	Shelduck is considered to be of high sensitivity to disturbance (Cutts *et al*., 2013). Therefore, the presence of construction associated with HDD works in Langstone Harbour may disturb shelduck at both roosting and foraging components of their daily cycle. This species was recorded on a monthly basis in intertidal areas of the Study Area during surveys conducted for the Proposed Development, with highest numbers recorded at low tide (up to 66 individuals) (ES Appendix 16.13). Given the proximity of these areas to the Proposed Development, it is considered that construction and decommissioning works may displace wintering shelduck from favoured foraging and roosting habitat through unpredictable noise events. However, the Proposed Development is within an industrialised setting so that the noise effects would not add to baseline conditions. Other than where HDD routes underlie the SPA, the Order Limits do not coincide with the SPA itself. Furthermore, effects of the construction stage on Chichester and Langstone Harbour SPA and it's wintering intertidal bird community will be avoided by restricting works within the winter season, defined as October to March (the period when SPA birds such as shelduck arrive from their breeding grounds (Snow and Perrins, 1998). A detailed overview of the working restriction was provided in Chapter 16: Onshore Ecology and Appendix 16.14: Winter Working Restriction for Features of Chichester & Langstone Harbours SPA (APP-422) and then subject to revision

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					following consultation with Natural England which are captured in the updated Outline Onshore Construction Environmental Monitoring Plan (OOCEMP; APP-505 Rev004). Shelduck was recorded in intertidal habitat only during the surveys undertaken for the Proposed Development. Principles 3– 6 apply to this species: • **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 dBLAmax immediately adjacent to a major road and/or adjacent to industrial sites with notable levels (>60 dB) of existing noise can be undertaken unrestricted. It is considered that noise levels from the Proposed Development 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 69dbLAmax – 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). Adoption of these principles will ensure that there are no adverse effects from noise, vibrationand visual disturbance on shelduck within the SPA. Noise effects from both trenching / road saw and HDD works overlaps at 69dbLAmax is extremely limited with regards to intertidal habitat. Trenching / road saw construction is restricted along Eastern Road because of overlap with SWBGS sites so this section will also not provide any disturbance to adjacent intertidal habitat. The only other section of the route that is restricted by Principle 6 is the section of the Onshore Cable Route from Milton Locks north to the P23B SWBGS. In accordance with the requirements of the OOCEMP, screening of at least 2 m high around the perimeter of the HDD compounds is required for the purpose of noise mitigation. Example screening solutions are presented in plate 6.1 of the OOCEMP (APP-505 Rev004). The benefit this screening affords has been included in 3D noise modelling for the HDD works in proximity to the SWBGS sites. Construction noise at over 69db LAmax as a result of this screening only occurs outside of the compounds for HDD-4 and HDD-6. The SPA is in an urban setting and recent research has established that visual disturbance does not have a significant impact on waterbirds in an estuary close to conurbations (Goss-Custard *et al*., 2019). The screening at the perimeter of HDD compounds will however also reduce visual disturbance to indistinguishable levels regardless of the baseline environment.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					Therefore, it is considered that potential effects on shelduck resulting from disturbance and displacement from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) are considered to be localised and temporary. The North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL) includes a full winter working restriction (October – March) so will not disturb shelduck. Such restrictions have been adopted by other plans or projects 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). Potential overlap between the Proposed Development Order Limits and mitigation areas for the North Portsea Island Coastal Flood Defence Scheme Phase 4b would occur if the Proposed Developments southern route option around Milton Common is taken. However, those compensation measures do not form part of the proposed mitigations/compensations to be provided in connection with the planning permission with reference 19/01368/FUL as per the most recent documents submitted to discharge the relevant planning conditions. As such, it is considered that there is no potential for adverse effects on site integrity from disturbance and displacement, either alone or in combination with other project and plans (for full details see Appendix 1 for the screening and integrity matrices for the SPA and Appendix 5 for the Ramsar site).
		Accidental spills and Litter	Supporting habitat: –costal and food availability	Maintain the distribution, abundance and availability of key food and prey items e.g. *Hydrobia, Corophium, Nereis*, hatching midges) at preferred sizes.	Unplanned oil or chemical spillages may occur during the construction and decommissioning phases. Spills have the potential to directly affect shelduck utilising intertidal and other supporting habitats resulting in mortality. Unplanned disposal of industrial or user plastic during construction and decommissioning phases also has the potential to cause shelduck mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and Material Resources of the ES APP-142)) will ensure that these events are prevented will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505 Rev004) and detail incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP') . The key matters of the SWMP are to: • 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;

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					• 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. Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailed CEMP specific to the works to be undertaken and agreed with relevant statutory consultees prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater (APP-134) and further captured in the Onshore Outline CEMP (APP-505 Rev004) 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. Therefore, it is considered that potential effects on shelduck resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) plus the North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL), are considered to be localised and temporary. Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (see Appendix 1 for the screening and integrity matrices for the SPA and Appendix 5 for the Ramsar site).
Pintail	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Disturbance and displacement	Disturbance caused by human activity	Reduce the frequency, duration and/or intensity of disturbance affecting roosting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed.	Pintail is considered to be of moderate sensitivity to disturbance. Therefore, the presence of construction associated with HDD works in Langstone Harbour may disturb pintail at both roosting and foraging components of their daily cycle. This species was recorded on the majority of low tide surveys conducted for the Proposed Development in intertidal areas of the Study Area where up to 75 individuals were noted (APP-421). Given the proximity of these areas to the Proposed Development, construction and decommissioning works may displace wintering pintail from favoured foraging and roosting habitat through

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					unpredictable noise events. However, the Proposed Development is within an industrialised setting so that the noise effects would not add to baseline conditions. Other than where HDD routes underlie the SPA, the Order Limits do not coincide with the SPA itself. Furthermore, effects of the construction stage on Chichester and Langstone Harbour SPA and its wintering intertidal bird community will be avoided by restricting works within the winter season, defined as October to March (the period when SPA birds such as pintail arrive from their breeding grounds (Snow and Perrins, 1998). A detailed overview of the working restriction was provided in Chapter 16: Onshore Ecology and Appendix 16.14: Winter Working Restriction for Features of Chichester & Langstone Harbours SPA (APP-422) and then subject to revision following consultation with Natural England which are captured in the updated Outline Onshore Construction Environmental Monitoring Plan (OOCEMP; APP-505 Rev004). Pintail was recorded in intertidal habitat only during the surveys undertaken for the Proposed Development. Principles 3– 6 apply to this species: • **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 dBLAmax immediately adjacent to a major road and/or adjacent to industrial sites with notable levels (>60 dB) of existing noise can be undertaken unrestricted. It is considered that noise levels from the Proposed Development 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 69dbLAmax – 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). Adoption of these principles ensure that there are no adverse effects from noise vibration and visual disturbance on pintail within the SPA. Noise effects from both trenching / road saw and HDD works overlaps at 69dbLAmax is extremely limited with regards to intertidal habitat. Trenching / road saw construction is restricted along Eastern Road because of overlap with SWBGS sites so this section will also not provide any disturbance to adjacent intertidal habitat. The only other section of the route that is restricted by Principle 6 is the section of the Onshore Cable Route from Milton Locks north to the P23B SWBGS. In accordance with the requirements of the OOCEMP, screening of at least 2 m high around the perimeter of the HDD compounds is required for the purpose of noise mitigation. Example screening solutions are presented in plate 6.1 of the OOCEMP (APP-505 Rev004). The benefit this screening affords has been

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					included in 3D noise modelling for the HDD works in proximity to the SWBGS sites. Construction noise at over 69db LAmax as a result of this screening only occurs outside of the compounds for HDD-4 and HDD-6. The SPA is in an urban setting and recent research has established that visual disturbance does not have a significant impact on waterbirds in an estuary close to conurbations (Goss-Custard *et al*., 2019). The screening at the perimeter of HDD compounds will however also reduce visual disturbance to indistinguishable levels regardless of the baseline environment. Therefore, it is considered that potential effects on pintail resulting from disturbance and displacement from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) are considered to be localised and temporary. The North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL) includes a full winter working restriction (October – March) so will not disturb pintail. Such restrictions have been adopted by other plans or projects 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). Potential overlap between the Proposed Development Order Limits and mitigation areas for the North Portsea Island Coastal Flood Defence Scheme Phase 4b would occur if the Proposed Developments southern route option around Milton Common is taken. However, those compensation measures do not form part of the proposed mitigations/compensations to be provided in connection with the planning permission with reference 19/01368/FUL as per the most recent documents submitted to discharge the relevant planning conditions. As such, it is considered that there is no potential for adverse effects on site integrity from disturbance and displacement, either alone or in combination with other project and plans (for full details see Appendix 1 for the screening and integrity matrices for the SPA and Appendix 5 for the Ramsar site).
		Accidental spills and Litter	Supporting habitat: –food availability	Maintain the distribution, abundance and availability of key food and prey items e.g. *Eleocharis palustris, Potamogeton, Elodea, Rumex, Glyceria, Chara*, hatching midges, insects, molluscs, crustaceans, *Hydrobia*, cereal	Unplanned oil or chemical spillages may occur during the construction and decommissioning phases. Spills have the potential to directly affect pintail utilising intertidal and other supporting habitats resulting in mortality. Unplanned disposal of industrial or user plastic during construction and decommissioning phases also has the potential to cause pintail mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and Material Resources of the ES APP-142) will ensure that these events are prevented and will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
				grains and potatoes) at preferred sizes.	Rev004 and detail incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP'). The key matters of the SWMP are to: • 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. Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailed CEMP specific to the works to be undertaken and agreed with relevant authority prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater (APP-134) and further captured in the Onshore Outline CEMP (APP-505 Rev004) 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 Therefore, it is considered that potential effects on pintail resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) plus the North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL), are considered to be localised and temporary. Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (see Appendix 1 for the screening and intregrity matrices for the SPA and Appendix 5 for the Ramsar site).

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Shoveler	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Disturbance and displacement	Disturbance caused by human activity	Reduce the frequency, duration and/or intensity of disturbance affecting roosting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed.	Shoveler is considered to be of moderate sensitivity to disturbance. Therefore, the presence of construction associated with HDD works in Langstone Harbour may disturb shoveler at both roosting and foraging components of their daily cycle. This species was recorded during a single low tide survey conducted for the Proposed Development where two individuals were noted on intertidal habitat (APP-421). Given the proximity of suitable habitat for this species to the Proposed Development, it is considered that construction and decommissioning works may displace wintering shoveler from favoured habitat through unpredictable noise events, although it is evident that only very small numbers are present. The Proposed Development is within an industrialised setting so that noise effects would not add to baseline conditions. Other than where HDD routes underlie the SPA, the Order Limits do not coincide with the SPA itself. Furthermore, effects of the construction stage on Chichester and Langstone Harbour SPA and its wintering intertidal bird community will be avoided by restricting works within the winter season, defined as October to March (the period when SPA birds such as shoveler arrive from their breeding grounds (Snow and Perrins, 1998). A detailed overview of the working restriction was provided in Chapter 16: Onshore Ecology and Appendix 16.14: Winter Working Restriction for Features of Chichester & Langstone Harbours SPA (APP-422) and then subject to revision following consultation with Natural England which are captured in the updated Outline Onshore Construction Environmental Monitoring Plan (OOCEMP; APP-505 Rev004). Shoveler was recorded in intertidal habitat only during the surveys undertaken for the Proposed Development. Principles 3– 6 apply to this species: • **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 dBLAmax immediately adjacent to a major road and/or adjacent to industrial sites with notable levels (>60 dB) of existing noise can be undertaken unrestricted. It is considered that noise levels from the Proposed Development 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 69dbLAmax – 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). Adoption of these principles will ensure that there are no adverse effects from noise, vibration and visual disturbance on shoveler within the SPA. Noise effects from both trenching / road saw and HDD works overlaps at 69dbLAmax is extremely limited with regards to intertidal habitat. Trenching / road saw

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					construction is restricted along Eastern Road because of overlap with SWBGS sites so this section will also not provide any disturbance to adjacent intertidal habitat. The only other section of the route that is restricted by Principle 6 is the section of the Onshore Cable Route from Milton Locks north to the P23B SWBGS. In accordance with the requirements of the OOCEMP, screening of at least 2 m high around the perimeter of the HDD compounds is required for the purpose of noise mitigation. Example screening solutions are presented in plate 6.1 of the OOCEMP (APP-505 Rev004). The benefit this screening affords has been included in 3D noise modelling for the HDD works in proximity to the SWBGS sites. Construction noise at over 69db LAmax as a result of this screening only occurs outside of the compounds for HDD-4 and HDD-6. The SPA is in an urban setting and recent research has established that visual disturbance does not have a significant impact on waterbirds in an estuary close to conurbations (Goss-Custard *et al*., 2019). The screening at the perimeter of HDD compounds will however also reduce visual disturbance to indistinguishable levels regardless of the baseline environment. Therefore, it is considered that potential effects on shoveler resulting from disturbance and displacement from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) are considered to be localised and temporary. The North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL) includes a full winter working restriction (October – March) so will not disturb shoveler. Such restrictions have been adopted by other plans or projects 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). Potential overlap between the Proposed Development Order Limits and mitigation areas for the North Portsea Island Coastal Flood Defence Scheme Phase 4b would occur if the Proposed Developments southern route option around Milton Common is taken. However, those compensation measures do not form part of the proposed mitigations/compensations to be provided in connection with the planning permission with reference 19/01368/FUL as per the most recent documents submitted to discharge the relevant planning conditions. As such, it is considered that there is no potential for adverse effects on site integrity from disturbance and displacement, either alone or in combination with other project and plans (for full details see Appendix 1 for the screening and intregrity matrices for the SPA).

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
		Accidental spills and Litter	Supporting habitat: –food availability	Maintain the distribution, abundance and availability of key food and prey items e.g. *cirpus, Eleocharis, Carex, Potamogeton, Glyceria*, surface plankton, hatching midges, Hydrobia, crustaceans, caddisflies, diptera, beetles) at preferred sizes.	Unplanned oil or chemical spillages may occur during the construction and decommissioning phases. Spills have the potential to directly affect shoveler utilising intertidal and other supporting habitats resulting in mortality. Unplanned disposal of industrial or user plastic during construction and decommissioning phases also has the potential to shoveler mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and Material Resources of the ES APP-142)) will ensure that these events are preventedand will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505 Rev004) and detail incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP'). The key matters of the SWMP are to: • 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. Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailed CEMP specific to the works to be undertaken and agreed with relevant authority prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater (APP-134) and further captured in the Onshore Outline CEMP (APP-505 Rev004) 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 Therefore, it is considered that potential effects on shoveler resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) plus the North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL), are considered to be localised and temporary. Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (see Appendix 1 for the screening and intregrity matrices for the SPA).
Teal	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Disturbance and displacement	Disturbance caused by human activity	Reduce the frequency, duration and/or intensity of disturbance affecting roosting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed.	Teal is considered to be of moderate sensitivity to disturbance. Therefore, the presence of construction associated with HDD works in Langstone Harbour may disturb teal at both roosting and foraging components of their daily cycle. although it is evident from surveys conducted for the Proposed Development that only very small numbers are present (APP-421). The Proposed Development lies within an industrialised setting so that noise effects would not add to baseline conditions. Other than where HDD routes underlie the SPA, the Order Limits do not coincide with the SPA itself. Furthermore, effects of the construction stage on Chichester and Langstone Harbour SPA and its wintering intertidal bird community will be avoided by restricting works within the winter season, defined as October to March (the period when SPA birds such as teal arrive from their breeding grounds (Snow and Perrins, 1998). A detailed overview of the working restriction was provided in Chapter 16: Onshore Ecology and Appendix 16.14: Winter Working Restriction for Features of Chichester & Langstone Harbours SPA (APP-422) and then subject to revision following consultation with Natural England which are captured in the updated Outline Onshore Construction Environmental Monitoring Plan (OOCEMP; APP-505 Rev004). Teal was recorded in intertidal habitat only during the surveys undertaken for the Proposed Development. Principles 3– 6 apply to this species: • **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 dBLAmax immediately adjacent to a major road and/or adjacent to industrial sites with notable levels (>60 dB) of existing noise can be undertaken unrestricted. It is considered that noise levels from the Proposed Development would be masked in these instances.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					• **Principle 6:** Percussive piling or works with heavy machinery (i.e. plant resulting in a noise level in excess of 69dbLAmax – 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). Adoption of these principles will ensure that there are no adverse effects from noise, vibration and visual disturbance on teal within the SPA. Noise effects from both trenching / road saw and HDD works overlaps at 69dbLAmax is extremely limited with regards to intertidal habitat. Trenching / road saw construction is restricted along Eastern Road because of overlap with SWBGS sites so this section will also not provide any disturbance to adjacent intertidal habitat. The only other section of the route that is restricted by Principle 7 is the section of the Onshore Cable Route from Milton Locks north to the P23B SWBGS. In accordance with the requirements of the OOCEMP, screening of at least 2 m high around the perimeter of the HDD compounds is required for the purpose of noise mitigation. Example screening solutions are presented in plate 6.1 of the OOCEMP (APP-505 Rev004). The benefit this screening affords has been included in 3D noise modelling for the HDD works in proximity to the SWBGS sites. Construction noise at over 69db LAmax as a result of this screening only occurs outside of the compounds for HDD-4 and HDD-6. The SPA is in an urban setting and recent research has established that visual disturbance does not have a significant impact on waterbirds in an estuary close to conurbations (Goss-Custard *et al*., 2019). The screening at the perimeter of HDD compounds will however also reduce visual disturbance to indistinguishable levels regardless of the baseline environment. Therefore, it is considered that potential effects on teal resulting from disturbance and displacement from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development APP-423 and APP-424) are considered to be localised and temporary. The North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL) includes a full winter working restriction (October – March) so will not disturb teal. Such restrictions have been adopted by other plans or projects 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). Potential overlap between the Proposed Development Order Limits and mitigation areas for the North Portsea Island Coastal Flood Defence Scheme Phase 4b would occur if the Proposed Developments southern route option around Milton Common is taken. However, those compensation measures do not form part of

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					the proposed mitigations/compensations to be provided in connection with the planning permission with reference 19/01368/FUL as per the most recent documents submitted to discharge the relevant planning conditions. As such, it is considered that there is no potential for adverse effects on site integrity from disturbance and displacement, either alone or in combination with other project and plans (for full details see Appendix 1 for the screening and intregrity matrices for the SPA and Appendix 5 for the Ramsar site).
		Accidental spills and Litter	Supporting habitat: food availability	Maintain the distribution, abundance and availability of key food and prey items e.g. *Salicornia, Atriplex*, cereal grains, *Polygonum, Eleocharis, Rumex, Ranunculus, Hydrobia*, flies, caddisfly, beetles, bugs, hatching midges) at preferred sizes.	Unplanned oil or chemical spillages may occur during the construction and decommissioning phases. Spills have the potential to directly affect teal utilising intertidal and other supporting habitats resulting in mortality. Unplanned disposal of industrial or user plastic during construction and decommissioning phases also has the potential to cause teal mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and Material sources of the ES APP-142) will ensure that these events are prevented and will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505 Rev004) and detail incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP'). The key matters of the SWMP are to: • 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. Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailed CEMP specific to the works to be undertaken and agreed with relevant authority prior to commencement of construction works. Measures detail in Chapter 19: Groundwater (APP-134)and further captured in the Onshore Outline CEMP (APP-505 Rev004) include: • Designated areas for the storage of hazardous materials, fuels and chemicals;

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					• 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 Therefore, it is considered that potential effects on teal resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) plus the North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL), are considered to be localised and temporary. Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (see Appendix 1 for the screening and intregrity matrices for the SPA and Appendix 5 for the Ramsar site).
Wigeon	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Disturbance and displacement	Disturbance caused by human activity	Reduce the frequency, duration and/or intensity of disturbance affecting roosting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed.	Wigeon is considered to be of moderate sensitivity to disturbance. Therefore, the presence of construction associated with HDD works in Langstone Harbour may disturb wigeon. This species was however unrecorded in intertidal areas of the Study Area during surveys conducted for the Proposed Development (APP-421). Given the proximity however of suitable habitat for this species to the Proposed Development, construction and decommissioning works may displace wintering wigeon through unpredictable noise events, although it is evident that at most, very small numbers are present. The Proposed Development lies within an industrialised setting so that noise effects would not add to baseline conditions. Other than where HDD routes underlie the SPA, the Order Limits do not coincide with the SPA itself. Furthermore, effects of the construction stage on Chichester and Langstone Harbour SPA and its wintering intertidal bird community will be avoided by restricting works within the winter season, defined as October to March (the period when SPA birds such as wigeon arrive from their breeding grounds (Snow and Perrins, 1998). A detailed overview of the working restriction was provided in Chapter 16: Onshore Ecology and Appendix 16.14: Winter Working Restriction for features of Chichester & Langstone Harbours SPA (APP-422) and then subject to revision following consultation with Natural England which are captured in the updated Outline Onshore Construction Environmental Monitoring Plan (OOCEMP; APP-505 Rev004). Those relevant to wigeon are Principles 3-6:

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					• **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 dBLAmax immediately adjacent to a major road and/or adjacent to industrial sites with notable levels (>60 dB) of existing noise can be undertaken unrestricted. It is considered that noise levels from the Proposed Development 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 69dbLAmax – 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). Adoption of these principles ensure that there is no adverse effect from noise, vibration and visual disturbance on wigeon within the SPA. Noise effects from both trenching / road saw and HDD works overlaps at 69dbLAmax is extremely limited with regards to intertidal habitat. Trenching / road saw construction is restricted along Eastern Road because of overlap with SWBGS sites so this section will also not provide any disturbance to adjacent intertidal habitat. The only other section of the route that is restricted by Principle 6 is the section of the Onshore Cable Route from Milton Locks north to the P23B SWBGS. In accordance with the requirements of the OOCEMP, screening of at least 2 m high around the perimeter of the HDD compounds is required for the purpose of noise mitigation. Example screening solutions are presented in plate 6.1 of the OOCEMP (APP-505 Rev004). The benefit this screening affords has been included in 3D noise modelling for the HDD works in proximity to the SWBGS sites. Construction noise at over 69db LAmax as a result of this screening only occurs outside of the compounds for HDD-4 and HDD-6. The SPA is in an urban setting and recent research has established that visual disturbance does not have a significant impact on waterbirds in an estuary close to conurbations (Goss-Custard *et al*., 2019). The screening at the perimeter of HDD compounds will however also reduce visual disturbance to indistinguishable levels regardless of the baseline environment. Therefore, it is considered that potential effects on wigeon resulting from disturbance and displacement from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) are considered to be localised and temporary.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					The North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL) includes a full winter working restriction (October – March) so will not disturb wigeon. Such restrictions have been adopted by other plans or projects 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). Potential overlap between the Proposed Development Order Limits and mitigation areas for the North Portsea Island Coastal Flood Defence Scheme Phase 4b would occur if the Proposed Developments southern route option around Milton Common is taken. However, those compensation measures do not form part of the proposed mitigations/compensations to be provided in connection with the planning permission with reference 19/01368/FUL as per the most recent documents submitted to discharge the relevant planning conditions. As such, it is considered that there is no potential for adverse effects on site integrity from disturbance and displacement, either alone or in combination with other project and plans (for full details see Appendix 1 for the screening and intregrity matrices for the SPA.
		Accidental spills and Litter	Supporting habitat: food availability	Maintain the distribution, abundance and availability of key food and prey items e.g. *Zostera, Enteromorpha, Polygonum, Eleocharis, Rumex, Ranunculus, Agrostis stolonifera, Puccinellia maritima, Salicornia* spp., hatching midges) at preferred sizes.	Unplanned oil or chemical spillages may occur during the construction and decommissioning phases. Spills have the potential to directly affect wigeon utilising intertidal and other supporting habitats resulting in mortality. Unplanned disposal of industrial or user plastic during construction and decommissioning phases also has the potential to cause wigeon mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and Material Resources of the ES APP-142) will ensure that these events are prevented and will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505 Rev004) and detail incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP'. The key matters of the SWMP are to: • 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

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					• 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. Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailed CEMP specific to the works to be undertaken and agreed with relevant authority prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater (APP-134) and further captured in the Onshore Outline CEMP (APP-505 Rev004) 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 Therefore, it is considered that potential effects on wigeon resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) plus the North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL), are considered to be localised and temporary. Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (see Appendix 1 for the screening and integrity matrices for the SPA).
Bar-tailed godwit	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Disturbance and displacement	Disturbance caused by human activity	Reduce the frequency, duration and/or intensity of disturbance affecting roosting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed.	Bar-tailed godwit is considered to be of moderate sensitivity to disturbance. Therefore, the presence of construction associated with HDD works in Langstone Harbour may disturb this species. This species was recorded on a single occasion only (of a single individual) in intertidal areas of the Study Area during surveys conducted for the Proposed Development (APP-421). Given the proximity however of suitable habitat for this species to the Proposed Development, it is considered that construction and decommissioning works may displace wintering bar-tailed godwit through unpredictable noise events, although it is evident that only very small numbers are present. The Proposed Development is however within an industrialised setting so that noise effects would not add to baseline conditions. Other than where HDD routes underlie the SPA, the Order Limits do not coincide with the SPA itself. Furthermore, effects of the construction stage on Chichester and Langstone Harbour SPA and its wintering intertidal bird community will be avoided by restricting works within the

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					winter season, defined as October to March (the period when SPA birds such as bar-tailed godwit arrive from their breeding grounds (Snow and Perrins, 1998). A detailed overview of the working restriction was provided in Chapter 16: Onshore Ecology and Appendix 16.14: Winter Working Restriction for Features of Chichester & Langstone Harbours SPA (APP-422) and then subject to revision following consultation with Natural England which are captured in the updated Onshore OCEMP; APP-505 Rev004). Those relevant to bar-tailed godwit which was only recorded utilising intertidal habitat are Principles 3-6: • **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 dBLAmax immediately adjacent to a major road and/or adjacent to industrial sites with notable levels (>60 dB) of existing noise can be undertaken unrestricted. It is considered that noise levels from the Proposed Development 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 69dbLAmax – 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). Adoption of these principles will ensure that there are no adverse effects from noise, vibration and visual disturbance on bar-tailed godwit within the SPA. Noise effects from both trenching / road saw and HDD works overlaps at 69dbLAmax is extremely limited with regards to intertidal habitat. Trenching / road saw construction is restricted along Eastern Road because of overlap with SWBGS sites so this section will also not provide any disturbance to adjacent intertidal habitat. The only other section of the route that is restricted by Principle 6 is the section of the Onshore Cable Route from Milton Locks north to the P23B SWBGS. In accordance with the requirements of the OOCEMP, screening of at least 2 m high around the perimeter of the HDD compounds is required for the purpose of noise mitigation. Example screening solutions are presented in plate 6.1 of the OOCEMP (APP-505 Rev004). The benefit this screening affords has been included in 3D noise modelling for the HDD works in proximity to the SWBGS sites. Construction noise at over 69db LAmax as a result of this screening only occurs outside of the compounds for HDD-4 and HDD-6. The SPA is in an urban setting and recent research has established that visual disturbance does not have a significant impact on waterbirds in an estuary close

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					to conurbations (Goss-Custard *et al*., 2019). The screening at the perimeter of HDD compounds will however also reduce visual disturbance to indistinguishable levels regardless of the baseline environment. Therefore, it is considered that potential effects on bar-tailed godwit resulting from disturbance and displacement from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) are considered to be localised and temporary. The North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL) includes a full winter working restriction (October – March) so will not disturb bar-tailed godwit. Such restrictions have been adopted by other plans or projects 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). Potential overlap between the Proposed Development Order Limits and mitigation areas for the North Portsea Island Coastal Flood Defence Scheme Phase 4b would occur if the Proposed Developments southern route option around Milton Common is taken. However, those compensation measures do not form part of the proposed mitigations/compensations to be provided in connection with the planning permission with reference 19/01368/FUL as per the most recent documents submitted to discharge the relevant planning conditions. As such, it is considered that there is no potential for adverse effects on site integrity from disturbance and displacement, either alone or in combination with other project and plans (for full details see Appendix 1 for the screening and intregrity matrices for the SPA.
		Accidental spills and Litter	Supporting habitat: food availability	Maintain the distribution, abundance and availability of key food and prey items e.g. *Arenicola, Nereis*) at preferred sizes.	Unplanned oil or chemical spillages may occur during the construction and decommissioning phases. Spills have the potential to directly affect bar-tailed godwit utilising intertidal and other supporting habitats resulting in mortality. Unplanned disposal of industrial or user plastic during construction and decommissioning phases also has the potential to cause bar-tailed godwit mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and Material Resources of the ES APP-142)) will ensure that these events are prevented and will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505 Rev004) and detail incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP'). The key matters of the SWMP are to:

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					• 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. Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailed CEMP specific to the works to be undertaken and agreed with relevant authority prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater and further captured in the Onshore Outline CEMP (APP-505 Rev004) 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. Therefore, it is considered that potential effects on bar-tailed godwit resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (Appendices 16.15 and 16.16 of the ES) plus the North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL), are considered to be localised and temporary. Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (see Appendix 1 for the screening and integrity matrices for the SPA).

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Black-tailed Godwit[44]	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Disturbance and displacement	Disturbance caused by human activity	Reduce the frequency, duration and/or intensity of disturbance affecting roosting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed.	Black-tailed godwit is considered to be of moderate sensitivity to disturbance. Therefore, the presence of construction associated with HDD works in Langstone Harbour may disturb this species. This species was recorded on four occasions in intertidal areas of the Study Area during surveys conducted for the Proposed Development with a peak count of 75 birds (APP-421). Given the proximity however of suitable habitat for this species to the Proposed Development, it is considered that construction and decommissioning works may displace wintering black-tailed godwit through unpredictable noise events, although it is evident that only very small numbers are present. The Proposed Development is however within an industrialised setting so that noise effects would not add to baseline conditions. Other than where HDD routes underlie the SPA, the Order Limits do not coincide with the SPA itself. Furthermore, effects of the construction stage on Chichester and Langstone Harbour SPA and its wintering intertidal bird community will be avoided by restricting works within the winter season, defined as October to March (the period when SPA birds such as bar-tailed godwit arrive from their breeding grounds (Snow and Perrins, 1998). A detailed overview of the working restrictions are provided in Chapter 16: Onshore Ecology (APP-131) and Appendix 16.14: Winter Working Restriction for Features of Chichester & Langstone Harbours SPA (APP-422)and then subject to revision following consultation with Natural England which are captured in the updated Outline Onshore Construction Environmental Monitoring Plan (OOCEMP; APP-505 Rev004). Those relevant to black-tailed godwit which was only recorded utilising intertidal habitat are Principles 3-6: • **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 dBLAmax immediately adjacent to a major road and/or adjacent to industrial sites with notable levels (>60 dB) of existing noise can be undertaken unrestricted. It is considered that noise levels from the Proposed Development 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 69dbLAmax – 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). Adoption of these principles will ensure that there are no adverse effects from noise, vibration and visual disturbance on black-tailed godwit within the SPA. Noise effects from both trenching / road saw and HDD works overlaps at

[44] Black-tailed godwit qualifies for the Ramsar site only – conservation objectives presented are reproduced from bar-tailed godwit from the SPA.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					69dbLAmax is extremely limited with regards to intertidal habitat. Trenching / road saw construction is restricted along Eastern Road because of overlap with SWBGS sites so this section will also not provide any disturbance to adjacent intertidal habitat. The only other section of the route that is restricted by Principle 6 is the section of the Onshore Cable Route from Milton Locks north to the P23B SWBGS. In accordance with the requirements of the OOCEMP, screening of at least 2 m high around the perimeter of the HDD compounds is required for the purpose of noise mitigation. Example screening solutions are presented in plate 6.1 of the OOCEMP (APP-505 Rev004). The benefit this screening affords has been included in 3D noise modelling for the HDD works in proximity to the SWBGS sites. Construction noise at over 69db LAmax as a result of this screening only occurs outside of the compounds for HDD-4 and HDD-6. The SPA is in an urban setting and recent research has established that visual disturbance does not have a significant impact on waterbirds in an estuary close to conurbations (Goss-Custard *et al*., 2019). The screening at the perimeter of HDD compounds will however also reduce visual disturbance to indistinguishable levels regardless of the baseline environment. Therefore, it is considered that potential effects on black-tailed godwit resulting from disturbance and displacement from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) are considered to be localised and temporary. The North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL) includes a full winter working restriction (October – March) so will not disturb black-tailed godwit. Such restrictions have been adopted by other plans or projects 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). Potential overlap between the Proposed Development Order Limits and mitigation areas for the North Portsea Island Coastal Flood Defence Scheme Phase 4b would occur if the Proposed Developments southern route option around Milton Common is taken. However, those compensation measures do not form part of the proposed mitigations/compensations to be provided in connection with the planning permission with reference 19/01368/FUL as per the most recent documents submitted to discharge the relevant planning conditions. As such, it is considered that there is no potential for adverse effects on site integrity from disturbance and displacement, either alone or in combination with other project and plans (for full details see Appendix 5 for the screening and integrity matrices for the Ramsar site).

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
		Accidental spills and Litter	Supporting habitat: food availability	Maintain the distribution, abundance and availability of key food and prey items e.g. *Arenicola, Nereis*) at preferred sizes.	Unplanned oil or chemical spillages may occur during the construction and decommissioning phases. Spills have the potential to directly affect black-tailed godwit utilising intertidal and other supporting habitats resulting in mortality. Unplanned disposal of industrial or user plastic during construction and decommissioning phases also has the potential to cause black-tailed godwit mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and Material Resources of the ES APP-142) will ensure that these events are preventedand will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505 Rev004) and detail incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP'). The key matters of the SWMP are to: • 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. Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailed CEMP specific to the works to be undertaken and agreed with relevant authority prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater (APP-134) and further captured in the Onshore Outline CEMP (APP-505 Rev004) 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. Therefore, it is considered that potential effects on black-tailed godwit resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) plus the North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL), are considered to be localised and temporary. Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (see Appendix 5 for the screening and integrity matrices for the Ramsar site).
Curlew	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Disturbance and displacement	Disturbance caused by human activity	Reduce the frequency, duration and/or intensity of disturbance affecting roosting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed.	Curlew is considered to be of moderate sensitivity to disturbance. Therefore, the presence of construction associated with HDD works in Langstone Harbour may disturb this species. This species was recorded at all low tide surveys and occasional surveys at high tide in intertidal areas of the Study Area with up to 61 individuals noted (APP-421). Given the proximity of these areas to the Proposed Development, it is considered that construction and decommissioning works may displace wintering curlew from favoured habitat through unpredictable noise events. The Proposed Development is however within an industrialised setting so that noise effects would not add to baseline conditions. Other than where HDD routes underlie the SPA, the Order Limits do not coincide with the SPA itself. Furthermore, effects of the construction stage on Chichester and Langstone Harbour SPA and its wintering intertidal bird community will be avoided by restricting works within the winter season, defined as October to March (the period when SPA birds such as curlew arrive from their breeding grounds (Snow and Perrins, 1998). A detailed overview of the working restrictions was provided in Chapter 16: Onshore Ecology and Appendix 16.14: Winter Working Restriction for Features of Chichester & Langstone Harbours SPA (APP-422)and then subject to revision following consultation with Natural England which are captured in the updated Outline Onshore Construction Environmental Monitoring Plan (OOCEMP; APP-505 Rev004). Those relevant to curlew which was only recorded utilising intertidal habitat are Principles 3-6: • **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 dBLAmax immediately adjacent to a major road and/or adjacent to industrial sites with notable levels (>60 dB) of existing noise can be undertaken unrestricted. It is considered that noise levels from the Proposed Development would be masked in these instances.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					• **Principle 6:** Percussive piling or works with heavy machinery (i.e. plant resulting in a noise level in excess of 69dbLAmax – 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). Adoption of these principles will ensure that there are no adverse effects from noise, vibration and visual disturbance on curlew within the SPA. Noise effects from both trenching / road saw and HDD works overlaps at 69dbLAmax is extremely limited with regards to intertidal habitat. Trenching / road saw construction is restricted along Eastern Road because of overlap with SWBGS sites so this section will also not provide any disturbance to adjacent intertidal habitat. The only other section of the route that is restricted by Principle 6 is the section of the Onshore Cable Route from Milton Locks north to the P23B SWBGS. In accordance with the requirements of the OOCEMP, screening of at least 2 m high around the perimeter of the HDD compounds is required for the purpose of noise mitigation. Example screening solutions are presented in plate 6.1 of the OOCEMP (APP-505 Rev004). The benefit this screening affords has been included in 3D noise modelling for the HDD works in proximity to the SWBGS sites. Construction noise at over 69db LAmax as a result of this screening only occurs outside of the compounds for HDD-4 and HDD-6. The SPA is in an urban setting and recent research has established that visual disturbance does not have a significant impact on waterbirds in an estuary close to conurbations (Goss-Custard *et al*., 2019). The screening at the perimeter of HDD compounds will however also reduce visual disturbance to indistinguishable levels regardless of the baseline environment. Therefore, it is considered that potential effects on curlew resulting from disturbance and displacement from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) are considered to be localised and temporary. The North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL) includes a full winter working restriction (October – March) so will not disturb curlew. Such restrictions have been adopted by other plans or projects 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). Potential overlap between the Proposed Development Order Limits and mitigation areas for the North Portsea Island Coastal Flood Defence Scheme Phase 4b would occur if the Proposed Developments southern route option around Milton

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					Common is taken. However, those compensation measures do not form part of the proposed mitigations/compensations to be provided in connection with the planning permission with reference 19/01368/FUL as per the most recent documents submitted to discharge the relevant planning conditions. As such, it is considered that there is no potential for adverse effects on site integrity from disturbance and displacement, either alone or in combination with other project and plans (for full details see Appendix 1 for the SPA screening and integrity matrices).
		Accidental spills and Litter	Supporting habitat: food availability	Maintain the distribution, abundance and availability of key food and prey items e.g. earthworm, leatherjackets, *Coleoptera, Orthoptera, Carcinus*, *Nereis*) at preferred sizes.) at preferred sizes.	Unplanned oil or chemical spillages may occur during the construction and decommissioning phases. Spills have the potential to directly affect curlew utilising intertidal and other supporting habitats resulting in mortality. Unplanned disposal of industrial or user plastic during construction and decommissioning phases also has the potential to cause curlew mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and Material Resources of the ES APP-142) will ensure that these events are preventedand will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505 Rev004) and detail incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP'. The key matters of the SWMP are to: • 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. Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailed CEMP specific to the works to be undertaken and agreed with relevant authority prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater (APP-134) and further captured in the Onshore Outline CEMP include: • Designated areas for the storage of hazardous materials, fuels and chemicals;

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					• 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. Therefore, it is considered that potential effects on curlew resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) plus the North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL), are considered to be localised and temporary. Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (see Appendix 1 for the SPA screening and integrity matrices).
Grey plover	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Disturbance and displacement	Disturbance caused by human activity	Reduce the frequency, duration and/or intensity of disturbance affecting roosting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed.	Grey plover is considered to be of moderate sensitivity to disturbance. Therefore, the presence of construction associated with HDD works in Langstone Harbour may disturb this species. occurred only at low tide during the surveys conducted for the Proposed Development (peak count of 19 in January 2018), with only one sighting at high tide. This species was restricted to intertidal mud habitat mainly in the south of the Study Area (APP-421). Given the proximity of these areas to the Proposed Development, it is considered that construction and decommissioning works may displace wintering grey plover from favoured habitat through unpredictable noise events. The Proposed Development is however within an industrialised setting so that the noise effects would not add to baseline conditions. Other than where HDD routes underlie the SPA, the Order Limits do not coincide with the SPA itself. Furthermore, effects of the construction stage on Chichester and Langstone Harbour SPA and its wintering intertidal bird community will be avoided by restricting works within the winter season, defined as October to March (the period when SPA birds such as grey plover arrive from their breeding grounds (Snow and Perrins, 1998). A detailed overview of the working restrictions was provided in Chapter 16: Onshore Ecology and Appendix 16.14: Winter Working Restriction for Features of Chichester & Langstone Harbours SPA (APP-422) and then subject to revision following consultation with Natural England which are captured in the updated Outline Onshore Construction Environmental Monitoring Plan (OOCEMP; APP-505 Rev004). Those relevant to grey plover which was only recorded utilising intertidal habitat are Principles 3-6:

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					• **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 dBLAmax immediately adjacent to a major road and/or adjacent to industrial sites with notable levels (>60 dB) of existing noise can be undertaken unrestricted. It is considered that noise levels from the Proposed Development 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 69dbLAmax – 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). Adoption of these principles will ensure that there are no adverse effects from noise, vibration and visual disturbance on grey plover within the SPA. Noise effects from both trenching / road saw and HDD works overlaps at 69dbLAmax is extremely limited with regards to intertidal habitat. Trenching / road saw construction is restricted along Eastern Road because of overlap with SWBGS sites so this section will also not provide any disturbance to adjacent intertidal habitat. The only other section of the route that is restricted by Principle 6 is the section of the Onshore Cable Route from Milton Locks north to the P23B SWBGS. In accordance with the requirements of the OOCEMP, screening of at least 2 m high around the perimeter of the HDD compounds is required for the purpose of noise mitigation. Example screening solutions are presented in plate 6.1 of the OOCEMP (APP-505 Rev004). The benefit this screening affords has been included in 3D noise modelling for the HDD works in proximity to the SWBGS sites. Construction noise at over 69db LAmax as a result of this screening only occurs outside of the compounds for HDD-4 and HDD-6. The SPA is in an urban setting and recent research has established that visual disturbance does not have a significant impact on waterbirds in an estuary close to conurbations (Goss-Custard *et al*., 2019). The screening at the perimeter of HDD compounds will however also reduce visual disturbance to indistinguishable levels regardless of the baseline environment. Therefore, it is considered that potential effects on grey plover resulting from disturbance and displacement from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) are considered to be localised and temporary.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					The North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL) includes a full winter working restriction (October – March) so will not disturb grey plover. Such restrictions have been adopted by other plans or projects 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). Potential overlap between the Proposed Development Order Limits and mitigation areas for the North Portsea Island Coastal Flood Defence Scheme Phase 4b would occur if the Proposed Developments southern route option around Milton Common is taken. However, those compensation measures do not form part of the proposed mitigations/compensations to be provided in connection with the planning permission with reference 19/01368/FUL as per the most recent documents submitted to discharge the relevant planning conditions. As such, it is considered that there is no potential for adverse effects on site integrity from disturbance and displacement, either alone or in combination with other project and plans (for full details see the screening and integrity matrices at Appendix 1 for the SPA and Appendix 5 for the Ramsar site).
		Accidental spills and Litter	Supporting habitat: food availability	Maintain the distribution, abundance and availability of key food and prey items e.g. *Nereis, Arenicola* and *Notomastus*) at preferred sizes.	Unplanned oil or chemical spillages may occur during the construction and decommissioning phases. Spills have the potential to directly affect grey plover utilising intertidal and other supporting habitats resulting in mortality. Unplanned disposal of industrial or user plastic during construction and decommissioning phases also has the potential to cause grey plover mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and Material Resources of the ES APP-142) will ensure that these events are preventedand will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505 Rev004) and detail incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP'). The key matters of the SWMP are to: • 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

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					• 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. Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailed CEMP in relation to the specific works to be undertaken and agreed with relevant authority prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater (APP-134) and further captured in the Onshore Outline CEMP (APP-505 Rev004) 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. Therefore, it is considered that potential effects on grey plover resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-0423 and APP-424) plus the North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL), are considered to be localised and temporary. Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other projects and plans for full details see the screening and integrity matrices at Appendix 1 for the SPA and Appendix 5 for the Ramsar site).
Turnstone	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Accidental spills and Litter	Supporting habitat: food availability	Maintain the distribution, abundance and availability of key food and prey items e.g. *Balanus, Mytilus, Carcinus, Gammarus, Littorina,* dipertan flies, kelp-fly larvae) at preferred sizes.	Unplanned oil or chemical spillages may occur during the construction and decommissioning phases. Spills have the potential to directly affect turnstone utilising intertidal and other supporting habitats resulting in mortality. Unplanned disposal of industrial or user plastic during construction and decommissioning phases also has the potential to cause turnstone mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and Material Resources of the ES APP-142) will ensure that these events are preventedand will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505 Rev004) and detail incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP'). The key matters of the SWMP are to: • Identify the volume of waste streams likely to be produced during the works to establish the potential for reuse and recycling;

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					• 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. Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailed CEMP specific to the works to be undertaken and agreed with relevant authority prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater (APP-134) and further captured in the Onshore Outline CEMP (APP-505 Rev004) 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. Therefore, it is considered that potential effects on turnstone resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) plus the North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL), are considered to be localised and temporary. Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (for full details see the screening and integrity matrices at Appendix 1 for the SPA).
Sanderling	Maintaining or restoring the populations of qualifying features, and the distribution of	Accidental spills and Litter	Supporting habitat: food availability	Maintain the distribution, abundance and availability of key food and prey items e.g. *Bathyporeia* and *Mytilus* spat,	Unplanned oil or chemical spillages may occur during the construction and decommissioning phases. Spills have the potential to directly affect sanderling utilising intertidal and other supporting habitats resulting in mortality. Unplanned disposal of industrial or user plastic during construction and decommissioning phases also has the potential to cause sanderling mortality through ingestion or

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
	qualifying features within the site.			wrack flies, sandhoppers) at preferred sizes.	entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and Material Resources of the ES APP-142) will ensure that these events are prevented and will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505 Rev004) and detail incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP'). The key matters of the SWMP are to: • 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. Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailed CEMP specific to the works to be undertaken and agreed with relevant authority prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater (APP-134) and further captured in the Onshore Outline CEMP (APP-505 Rev004) 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. Therefore, it is considered that potential effects on sanderling resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) plus the North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL), are considered to be localised and temporary.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (for full details see the screening and integrity matrices at Appendix 1 for the SPA).
Ringed plover	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Accidental spills and Litter	Supporting habitat: food availability	Maintain the distribution, abundance and availability of key food and prey items e.g. Invertebrates, marine worms, crustaceans and molluscs) at preferred sizes.	Unplanned oil or chemical spillages may occur during the construction and decommissioning phases. Spills have the potential to directly affect ringed ploverutilising intertidal and other supporting habitats resulting in mortality. Unplanned disposal of industrial or user plastic during construction and decommissioning phases also has the potential to cause ringed plover mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and Material Resources of the ES APP-142) will ensure that these events are prevented and will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505 Rev004) and detail incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP'). The key matters of the SWMP are to: • 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. Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailed CEMP specific to the works to be undertaken and agreed with relevant statutory consultees prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater (APP-134) and further captured in the Onshore Outline CEMP (APP-505 Rev004) 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

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					• Drain socks to trap sediment entering the watercourse. Therefore, it is considered that potential effects on ringed plover resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424)) plus the North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL), are considered to be localised and temporary. Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (for full details see the screening and integrity matrices at Appendix 1 for the SPA and Appendix 5 for the Ramsar site).
Dunlin	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Accidental spills and Litter	Supporting habitat: food availability	Maintain the distribution, abundance and availability of key food and prey items e.g. *Nereis, Macoma, Hydrobia, Crangon, Carcinus*, dipertan flies, beetles, caddisfly, wasps, sawflies, mayflies) at preferred sizes.	Unplanned oil or chemical spillages may occur during the construction and decommissioning phases. Spills have the potential to directly affect dunlin utilising intertidal and other supporting habitats resulting in mortality. Unplanned disposal of industrial or user plastic during construction and decommissioning phases also has the potential to cause dunlin mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and Material Resources of the ES APP-142) will ensure that these events are preventedand will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505 Rev004) and detail incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP'). The key matters of the SWMP are to: • 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.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailed CEMP specific to the works to be undertaken and agreed with relevant authority prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater (APP-134) and further captured in the Onshore Outline CEMP (APP-505 Rev004) 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. Therefore, it is considered that potential effects on dunlin resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) plus the North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL), are considered to be localised and temporary. Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (for full details see the screening and integrity matrices at Appendix 1 for the SPA and Appendix 5 for the Ramsar site).
Waterfowl assemblage	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Disturbance and displacement	Disturbance caused by human activity	Reduce the frequency, duration and/or intensity of disturbance affecting roosting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed.	Species that contribute to the waterfowl assemblage of the SPA and Ramsar include those of both moderate and high sensitivity to disturbance, including most notably dark-bellied brent goose (Cutts *et al*., 2013). Therefore, construction activities associated with HDD works in Langstone Harbour have the potential to disturb all sensitive species within the assemblage while the Onshore Cable Route works in and adjacent to SWBGS sites have the potential to disturb dark-bellied brent geese at both roosting and foraging components of their daily cycle despite the industrial setting of the Proposed Development (SWBGS Steering Group, 2018). Specific surveys for this species for the Proposed Development recorded relatively low numbers of most components of the waterfowl assemblage notable numbers in intertidal areas although notable numbers of dark-bellied brent goose occurred in both intertidal and terrestrial (i.e. SWBGS) areas of the Study Area (APP-421). Furthermore, given the proximity of these areas to the Proposed Development, construction and decommissioning works are considered to have the potential to displace wintering dark-bellied brent goose from favoured foraging and roosting habitat through unpredictable noise events. Construction

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					work within the SWBGS sites will reduce the availability of grassland foraging habitat where the construction stage overlaps with the winter season when dark-bellied brent geese and other wintering birds that are qualifying features of the SPA are present, October to March (Carboneras et al. 2019). Work within the sites during winter would produce direct disturbance of the sites from noise and movements of construction vehicles and machinery, further restricting the availability of remaining grassland within the sites as foraging areas. The following SWBGS sites overlap with onshore components of the Proposed Development: • 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. Effects of the construction stage on Chichester and Langstone Harbour SPA and its wintering intertidal bird community will be avoided by restricting works within the winter season, defined as October to March (the period when SPA qualifying species such as dark-bellied brent goose arrive from their breeding grounds (Snow and Perrins, 1998). A detailed overview of the working restrictions are provided in Chapter 16: Onshore Ecology and Appendix 16.14: Winter Working Restriction for Features of Chichester and Langstone Harbours SPA (APP-422) and then subject to revisions following consultation with Natural England which are captured in the updated Outline Onshore CEMP (APP-505 Rev004). There are six principles that will be incorporated into working methods: • **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 Proposed Developments Order Limits during October – March. An exception is the gravel car park within site P11 that is 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 Harbour 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.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					• **Principle 4**: Construction noise events of <55 dB can occur unrestricted. • **Principle 5:** Construction works of 55 – 72 dBLAmax immediately adjacent to a major road and/or adjacent to industrial sites with notable levels (>60 dB) of existing noise can be undertaken unrestricted. It is considered that noise levels from the Proposed Development 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 69dbLAmax – 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). Adoption of Principle 1 (and reference to Principle 2) will ensure that there are no adverse effects on those SWBGS sites that lie within the Order Limits as detailed above (as these sites will not be subject to works in the winter period when they are used by SPA birds), and effects of noise, vibration and visual disturbance on birds within the SPA itself. Trenching / road saw noise at 69dbLAmax has the potential to affect fourteen SWBGS sites. However, SWBGS sites P54 and P29 will not be adversely affected due to the minimal overlap of the site areas with noise exceeding 69 dB from trenching / road saw works. It is also considered that the buildings that are situated between the construction works and SWBGS sites will effectively buffer the noise so that in reality, there will be no overlap of noise effects. In consequence, these two sites are excluded from the restriction. In relation to the remaining 12 sites although it considered likely that Principle 5 applies in this highly urbanised environment, construction work which would otherwise have the potential to impact on them is restricted during October – March. The percussive activities at HDD compounds in proximity to the SWBGS sites are anticipated to comprise the insertion of sheet piles via an excavator mounted vibrator at HDD-1, HDD-2, HDD-3 and HDD-6 and via a piling rig for the reception pit at HDD-4. In accordance with the requirements of the OOCEMP, screening of at least 2 m high around the perimeter of the HDD compounds is required for the purpose of noise mitigation. Example screening solutions are presented in plate 6.1 of the OOCEMP (APP-505 Rev004). The benefit this screening affords has been included in 3D noise modelling for the HDD works in proximity to the SWBGS sites. Construction noise at over 69db LAmax as a result of this screening only occurs outside of the compounds for HDD-4 and HDD-6. The SPA is in an urban setting and recent research has established that visual disturbance does not have a significant impact on waterbirds in an estuary close to conurbations (Goss-Custard *et al.*, 2019). The screening at the perimeter of

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					HDD compounds will however also reduce visual disturbance to indistinguishable levels regardless of the baseline environment. With the combination of the seasonal restriction and mitigation measures the potential effects on the watwerfowl assemblage resulting from disturbance and displacement from the Proposed Development alone will not result in an adverse effect on site integrity. Therefore, it is considered that potential effects on the waterfowl assemblage resulting from disturbance and displacement from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 And APP-424) are considered to be localised and temporary. The North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL) includes a full winter working restriction (October – March) so will not disturb dark-bellied brent goose. Such restrictions have been adopted by other plans or projects 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). Potential overlap between the Proposed Development Order Limits and mitigation areas for the North Portsea Island Coastal Flood Defence Scheme Phase 4b would occur if the southern route option around Milton Common is taken. However, those compensation measures do not form part of the proposed mitigations/compensations to be provided in connection with the planning permission with reference 19/01368/FUL as per the most recent documents submitted to discharge the relevant planning conditions. As such, it is considered that there is no potential for adverse effects on site integrity from disturbance and displacement, either alone or in combination with other project and plans (for full details see Appendix 1 for the screening and intregrity matrices for the SPA and Appendix 5 for the Ramsar site).
		Accidental spills and Litter	Supporting habitat: quality of supporting non-breeding habitat	Maintain the structure, function and availability of the following habitats which support the assemblage feature for all stages (moulting, roosting, loafing, feeding) of the non-breeding period: intertidal sediments, intertidal seagrass beds, intertidal rock, saltmarsh, subtidal sediments, coastal lagoons, reedbeds, grazing marsh, water column,	Unplanned oil or chemical spillages may occur during the construction and decommissioning phases. Spills have the potential to directly affect the waterfowl assemblage utilising intertidal and other supporting habitats resulting in mortality. Unplanned disposal of industrial or user plastic during construction and decommissioning phases also has the potential to cause waterfowl mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and Material Resources of the ES APP-142) will ensure that these events are prevented and will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505 Rev004) and detail incorporating a Materials

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
				improved grassland and arable fields.	Management Plan ('MMP') and Site Waste Management Plan ('SWMP'). The key matters of the SWMP are to: • 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. Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailed CEMP specific to the works to be undertaken and agreed with relevant statutory consultees prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater (APP-134) and further captured in the Onshore Outline CEMP (APP-505 Rev004) 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. Therefore, it is considered that potential effects on the waterfowl assemblage resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) plus the North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL), are considered to be localised and temporary. Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (for full details see the screening and integrity matrices at Appendix 1 for the SPA and Appendix 5 for the Ramsar site).

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Supporting habitat (freshwater and grazing marsh)	Maintaining or restoring the extent, distribution, structure, function and supporting processes of the habitats of the qualifying features	Indirect effects	Supporting habitat: extent and distribution of supporting habitat for the non-breeding season	Maintain the structure, function and availability of the following habitats which support the assemblage feature for all stages (moulting, roosting, loafing, feeding) of the non-breeding period: intertidal sediments, intertidal seagrass beds, intertidal rock, saltmarsh, subtidal sediments, coastal lagoons, reedbeds, grazing marsh, improved grassland and arable fields.	No habitat within the SPA/Ramsar site will be lost on either a permanent or temporary basis as a result of onshore construction / decommissioning activities. Several SWBGS sites do however lie within the Order Limits, namely: P08A, P11, P23A, P23B and P23R. SWBGS are areas that are of fundamental importance to over-wintering waterbirds in the Solent Region. SWBGS can be said to be functionally linked to the Special Protection Area (SPA) network including Chichester and Langstone Harbours SPA / Ramsar site. Construction work within these sites will result in temporary habitat loss to varying extents which would impact the availability of foraging and roosting resource to dark-bellied brent goose. Restoration measures will be implemented which require completion and grass sward re-established to provide a suitable food resource by October when brent geese return to the Solent to winter. The following two approaches are considered for restoration of SWBGS sites: • Re-seeding. Reinstate areas within SWBGS with grass seed before the end of May where practicable. This is the easiest and most cost effective option; • Re-turfing. Where not practicable to re-seed, turf will be laid and established. This is a more costly option but allows re-establishment and good sward growth in a shorter timescale. The choice of restoration approach is primarily dependent on the time available within the summer growing season for implementation. Re-seeding is not likely to be the optimal technique after May so that for any restoration works after this month, re-turfing would be implemented. These measures including details of site preparation, establishment and aftercare are provided in the revised Onshore Outline CEMP (APP-505 Rev004). P211, P23A and P23 R will be subject to re-turfing restoration within the appropriate timescales to allow reestablishment prior to October. P23B will be subject to either re-seeding or re-turfing. Components of P08A will not be restored until the month of October. However, no construction activities will take place on SWBGS sites in the non-breeding winter season so that visual and noise disturbance associated with these will not impact brent geese. National census data gathered by the British Trust for Ornithology (BTO) through their Wetland Bird Survey (WeBS) Scheme shows that numbers present in England during October are approximately 30% of those during the peak month of January. Additional important factors to consider include the amount of habitat that will require restoration in October and the proportion that it is of the SWBGS sites and the wider network.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					The October restoration area accounts for: • 12 % of the P08A SWBGS; • 1.2 % of SWBGS core sites; and • 0.2 % of the entire SWBGS network. On this basis, it is determined that the restoration of 1.7 ha during the month of October would not impair the SWBGS network and specifically it would not impact the non-breeding brent goose population. Irrespective of the temporary unavailability of 12% of the SWBGS, brent geese would not be disturbed and therefore the functionality of the P08A SWBGS would not be lost due to the extensive remaining habitat The temporary habitat loss accounts for just 1.2% of the SWBGS core sites and 0.2% of the SWBGS network. Brent geese will still be able to utilise the majority of Farlington SWBGS, which in itself forms just a small component of the SWBGS network available. The loss of habitat will be temporary, covering at most 17% of a single non-breeding season and during a period when the majority of the Solent brent goose population would not be present. The P08A SWBGS will be restored it its entirety for in advance of when the peak numbers of geese are present in the region. Therefore, it is considered that potential indirect effects on supporting habitat resulting from temporary loss of functionally linked SWBGS from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-4234 and APP-424) are considered to be localised and temporary. The North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL) includes a similar commitment to restore all SWBGS before the non-breeding season (October – March) so will not disturb dark-bellied brent goose. As such, it is considered that there is no potential for adverse effects on site integrity from indirect effects, either alone or in combination with other project and plans (for full details see Appendix 1 for the screening and intregrity matrices for the SPA and Appendix 5 for the Ramsar site).
		Accidental spills and Litter	Supporting habitat: quality of supporting non-breeding habitat	Maintain the structure, function and availability of the following habitats which support the assemblage feature for all stages (moulting, roosting, loafing, feeding) of the non-breeding period: intertidal	Unplanned oil or chemical spillages from construction activity may occur during construction and decommissioning phases. Spills have the potential to directly affect prey species within supporting habitats through a range of biological effects. Unplanned disposal of industrial plastic during all development phases also has the potential to affect prey species through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
				sediments, intertidal seagrass beds, intertidal rock, saltmarsh, subtidal sediments, coastal lagoons, reedbeds, grazing marsh, improved grassland and arable fields.	Material Resources of the ES APP-142) will ensure that these events are prevented and will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505 Rev004) and detail incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP'). The key matters of the SWMP are to: • 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. Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailed CEMP specific to the works to be undertaken and agreed with relevant authority prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater (APP-134) and further captured in the Onshore Outline CEMP 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. Therefore, it is considered that potential effects on supporting habitat resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) plus the North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL), are considered to be localised and temporary. Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (for full details see the screening and integrity matrices at Appendix 1 for the SPA and Appendix 5 for the Ramsar site).

Conclusion: No adverse effect on site integrity can be concluded, either from the Proposed Development alone, or in combination with other plans or projects, for the Chichester and Langstone Harbours SPA/Ramsar site.

10.4. MARINE: SOLENT AND DORSET COAST SPA

10.4.1. OVERVIEW

10.4.1.1. Solent and Dorset Coast SPA is located on the south coast within the Channel. The site is approximately 255.2 nautical miles squared (‘nmi^2’) and extends from the Isle of Purbeck in the west to Bognor Regis in the east, following the coastline on either side to the Isle of Wight and into Southampton Water. The SPA is proposed to protect important at-sea foraging areas used by qualifying interest features from colonies within adjacent, already classified SPAs. These qualifying interest features are three species of tern: common tern, Sandwich tern and little tern and the site boundary was established as a composite of the usage of the area within adjacent SPAs.

10.4.1.2. From west to east, the adjacent SPAs with these tern species as qualifying interest features (in parentheses) are: Poole Harbour (common tern) Solent and Southampton Water SPA (common, Sandwich and little tern) and Chichester & Langstone Harbours SPA (common, Sandwich and little tern). In addition to these species at these sites, Sandwich terns at the Poole Harbour SPA have been included in determining the details of the SPA. However, certain species at certain sites i.e. roseate tern at Solent and Southampton Water SPA, and Sandwich, little and common tern at Pagham Harbour SPA, have not been included in determining the details of the SPA. These exclusions have been made on the basis of these birds either not being a qualifying feature at the source SPAs and/or being present in such low numbers either at classification or recently (or both) to merit influencing the size and shape of the SPA.

10.4.2. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES)

10.4.2.1. Site-specific SACO is not currently available for the Solent and Dorset Coast SPA. As such, SACO available for the Chichester and Langstone Harbours SPA[45], which is adjacent to the SPA, has been used as a basis for the assessment.

10.4.2.2. Table 10.5 lists those attributes which are considered to be equivalent to those impacts for which an LSE could not be excluded.

Table 10.5 - SACO attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Little tern	Disturbance and displacement	Disturbance caused by human activity

[45] https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9011011&SiteName=Chichester+and+Langstone&SiteNameDisplay=Chichester+and+Langstone+Harbours+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=18 (Accessed October 2019)

Feature	Impact for which LSE could not be excluded	Equivalent attribute
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
Supporting habitat (water column)	Indirect effects	Supporting habitat: water quality - dissolved oxygen ('DO')
		Supporting habitat: water quality - turbidity
	Accidental spills and Litter	Supporting habitat: water quality - contaminants

10.4.2.3. Non-equivalent attributes listed within the SACO which were screened out from further assessment included:

- Breeding population: abundance;
- Connectivity with supporting habitats;
- Predation - all habitats;
- Supporting habitat: air quality;
- Supporting habitat: conservation measures;
- Supporting habitat: extent and distribution of supporting habitat for the breeding season;
- Supporting habitat: landform;
- Supporting habitat: vegetation characteristics for nesting; and
- Supporting habitat: water quality – nutrients.

10.4.2.4. Natural England in their advice on the draft HRA Report (dated 20 September 2019, see Appendix 4), confirmed that they were content with this approach i.e. only considering attributes in detail where they are relevant to the feature-activity-pressure interactions screened in at LSE stage.

10.4.3. ASSESSMENT OF POTENTIAL ADVERSE EFFECTS ON SITE INTEGRITY

10.4.3.1. For those designated features where LSE could not be excluded, an assessment of potential adverse effects on site integrity is presented in Table 10.6 below.

10.4.3.2. It is concluded that there will be no adverse effect on site integrity for the Solent and Dorset Coast SPA, either from the Proposed Development alone, or in combination with other plans or projects

Table 10.6 - Assessment of potential adverse effects on site integrity for the Solent and Dorset Coast SPA across all phases of the Proposed Development both alone and in combination with other plans and projects

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Little tern	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Disturbance and displacement	Disturbance caused by human activity	Restrict the frequency, duration and/or intensity of disturbance affecting roosting, nesting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed.	Little terns at sea are scored as being of moderate sensitivity to disturbance and therefore displacement (Garthe & Hüppop, 2004; Bradbury *et al*., 2014). Within Langstone and Chichester Harbours, breeding colonies of little tern are present. Given that little terns are known to forage in relatively close proximity to their breeding colonies, onshore HDD works within the Langstone Harbour (see Chapter 3 Description of the Proposed Development for locations of HDD1, HDD2 and HDD3) have potential to displace this species during foraging given its moderate sensitivity to disturbance at sea. Of the three onshore HDD locations, HDD3 at Kendall's Wharf is the closest location to a little tern breeding colony, located at a minimum distance of *c*.2 km from the Baker's Island colony. Sheet piling at HDD3 may therefore disturb and displace foraging birds through unpredictable noise events. However, these works will be above MHWS in an already industrialised setting. Vibro-hammering will be very short in duration (two hours for installation at each location) and noise levels from the EMV at HDD3 will be *c*.40 dB at Baker's Island, given that SPLs reduce by 6 dB each time the distance is doubled. Noise and visual disturbance associated with construction activities at HDD3 are will not be noticeable above baseline levels of disturbance within Langstone Harbour (Cutts & Allen, 1999; Cutts *et al*., 2009). In the event that little terns were temporarily disturbed from foraging in proximity to the onshore HDD works within Langstone Harbour, other equivalent foraging sites are present elsewhere in Chichester and Langstone Harbours which will be unaffected by the Proposed Development. Given that HDD1 and HDD2 are located further away from little tern breeding colonies, it is considered that there is no potential for impact from onshore HDD works at these locations, both of which are located above MHWS in an urban environment. Outside of Langstone Harbour, little terns may be present in shallow, nearshore waters at the mouth of Langstone Harbour. There is therefore potential for foraging birds to be disturbed and displaced by both unpredictable noise events and visual disturbance associated with construction activities at the marine HDD location off Eastney.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					Vibro-hammering at the marine HDD location will be short in duration and noise generated by the vibro-hammers and pipe-driving machine will be non-percussive and airbourne SPLs will not be noticeable above the baseline in this urban setting. Since little terns plunge dive to a maximum of 1 m whilst feeding (RPS, 2011), it is considered that exposure to any underwater noise resulting from the vibro-hammer and pipe driving machine will not be discernible above background underwater noise levels (median noise levels around the UK range from 81.5 to 95.5 dB re 1 μPa; Merchant *et al*., 2016). A single jack-up vessel, together with a multicat, a safety vessel, a crew transfer vessel and up to four workboats may be present at the marine HDD location for up to 44 weeks, with a total of 636 vessel movements predicted over this period. Grounding of cable lay barges at low tide between KP 1.0 and KP 4.7 will occur over a short duration of up to 4 weeks. This will not be noticeable above baseline levels of disturbance from the existing high levels of traffic within the area. Given that the foraging range of little tern is restricted to nearshore waters up to *c.*10 km (Thaxter *et al*., 2012; Parsons *et al.,* 2015), construction activities beyond this range will not impact this feature. Although it is anticipated that there may be up to *c.*825 vessel movements , including for the marine HDD works, over the anticipated 30-month construction period of the Proposed Development, the majority of these will be outside the foraging area of little terns. Furthermore, vessel traffic levels in the Channel and Solent are already high with 300 to 400 vessels transiting the area on a daily basis (Chapter 13, Shipping, Navigation and Other Marine Users, APP-128). As such, little terns which use the Marine Cable Corridor to forage will be habituated to such levels of disturbance. During operation, a worst-case failure rate of the Marine Cables would require repair once every 10-12 years. Repairs will be undertaken by a single vessel, over a short timeframe (weeks to months). Thus, the potential for disturbance and displacement effects on little tern during operation and maintenance would be less than during construction. Therefore, potential disturbance and displacement from the Proposed Development alone will not result in an adverse

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					effect on the integrity of little tern as a qualifying feature of this SPA. Potential effects resulting from plans or projects which have temporal and spatial overlap with the Proposed Development (Table 4 of Appendix 3) are considered to be highly localised and temporary. As such, it is considered that there will be no adverse effect on site integrity either alone or in combination with other project and plans (see Appendix 1 PINS matrices for further details).
		Indirect effects	Supporting habitat: food availability	Maintain the distribution, abundance and availability of key food and prey items (e.g. crustacea, annelids, sandeel, herring, clupeidae) at preferred sizes.	Little terns are effectively top predators of benthos, fish and shellfish populations and are considered likely to be of moderate sensitivity to habitat disturbance (Garthe & Hüppop, 2004; Bradbury *et al*., 2014). If seabed habitats (and therefore the prey species) are disturbed, the area may be temporarily devoid of any potential food sources, resulting in effective habitat loss. Furthermore, terns are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey from the sea surface. Activities associated with construction have the potential to release sediment into the water column during cable installation and associated works. Within Langstone Harbour where foraging little tern numbers may be high, HDD will be used. The entry/exit points of the drill are expected to be onshore, thus there is no pathway for the works to result in an increase in suspended sediment or resultant smothering. Therefore, the works will not affect the availability of tern prey species in Langstone Harbour. Outside of Langstone Harbour, excavation at the marine HDD pits (KP 1.0-1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations) will transport the finest sediments up to 10 km from the release point. However, SSC at these distances will be low (< 5 mg/l) and therefore not discernible above natural variation, which ranges from approximately <5 to 75 mg/l in coastal areas. There will be no adverse effects on the availability of of prey species at the Landfall since both habitat disturbance and increases in SSC will be temporary, short in duration and small in extent. Elsewhere within the Marine Cable Corridor, where foraging little tern densities are likely to be much lower (Parsons *et al*., 2015), the area of disturbed habitat for route preparation is anticipated to be a maximum of 3.6

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					km^2 along the entire Marine Cable Corridor (*c*.6%). Breeding little tern are not expected to be present beyond KP 21 given their mean-maximum foraging range (6.3 km ± 2.4 km; Thaxter *et al*., 2012). Within this nearshore area (KP 0 – 21), it is predicted that a peak SSC of up to 200 mg/l may be observed locally (i.e. within 2 km of the cable trench/HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km from the cable trench/HDD pit at which point concentrations of 5 to 10 mg/l are predicted; SSC is expected to return to background levels within a few days following completion of these activities. Most prey species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, together with high background levels of suspended sediment in the Solent already (Guillou *et al*., 2017). During operation, within Langstone Harbour, it is considered that there is no pathway for impact due to the onshore nature of the cable crossing. Outside of Langstone Harbour during operation, there will be no permanent loss of fish, shellfish and benthic habitat as a result of cable non-burial protection and no adverse effect on prey availability since these measures will be limited in spatial extent (*c*.0.7 km^2). During operation, repair or replacement of cables, although unlikely, may be required. An indicative worst-case failure rate of the Marine Cables could require a repair once every 10-12 years. Cable repair has the potential to have similar effects as during construction. However, the potential increases in SSC would be lower than during construction due to the smaller scale of a repair, with works being of shorter duration and more localised, which will not result in aadverse effect on site integrity. As such, the potential for impact from reduced prey availability resulting from seabed disturbance and increased turbidity from the Proposed Development alone is not predicted to result in an adverse effect on site integrity. Potential effects resulting from plans or projects which have temporal and spatial overlap with the Proposed Development (Table 4 of Appendix 3) are considered to be highly localised and temporary. As such, it is considered

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					that there is no potential for adverse effects on site integrity either alone or in combination with other project and plans (see Appendix 1 PINS matrices for further details).
			Supporting habitat: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	Little terns are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey. They are considered to be moderately sensitive to habitat disturbance (Bradbury *et al*., 2014). Activities associated with construction, repair and maintenance works have the potential to release sediment into the water column during cable installation and associated works e.g. HDD pit excavation. However, since HDD will be used within Langstone Harbour, with an onshore exit point, the volume of suspended material is considered to be negligible. Outside of Langstone Harbour, excavation at the marine HDD pits (KP 1.0-1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations) will transport the finest sediments up to 10 km from the release point. However, SSC at these distances will be low (< 5 mg/l) and therefore not discernible above natural variation, which ranges from approximately <5 to 75 mg/l in coastal areas. Elsewhere within the UK Marine Cable Corridor, where foraging little tern densities are likely to be much lower (Parsons *et al*., 2015), the area of disturbed habitat for route preparation is anticipated to be a maximum of 3.6 km^2 along the entire Marine Cable Corridor (*c*.6%). Breeding little tern are not expected to be present beyond KP 21, given their mean-maximum foraging range (6.3 km ± 2.4 km; Thaxter *et al*., 2012). Within this nearshore area (KP 0 – 21), it is predicted that a peak SSC of up to 200 mg/l may be observed locally (i.e. within 2 km of the cable trench/HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km from the cable trench/HDD pit at which point concentrations of 5 to 10 mg/l are predicted; SSC is expected to return to background levels within a few days following completion of these activities.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					Most prey species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, together with high background levels of suspended sediment in the Solent already (Guillou *et al*., 2017). During operation, repair or replacement of cables, although unlikely, may be required. An indicative worst-case failure rate of the Marine Cables could require a repair once every 10-12 years. Cable repair has the potential to have similar effects as during construction. However, potential increases in SSC would be lower than during construction due to the smaller scale of a repair, with works being of shorter duration and more localised, which will not result in any adverse effect on site integrity. As such, the potential for impacts from reduced prey availability resulting from increased turbidity from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from plans or projects which have temporal and spatial overlap with the Proposed Development (Table 4 of Appendix 3) are considered to be highly localised and temporary. As such, it is considered that there will be no adverse effect on site integrity from impacts on prey species within the water column from increased turbidity, either alone or in combination with other project and plans (see Appendix 1 PINS matrices for further details).
		Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect little terns utilising the sea surface through direct oiling resulting in mortality. Unplanned disposal of industrial or user plastic during all development phases also has the potential to cause little tern mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will prevent these events occurring and therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effect on site integrity for the project alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					effects, there will be no adverse effect on site integrity in combination with other plans and projects (see Appendix 1 PINS matrices for further details).
Sandwich tern	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Indirect effects	Supporting habitat: food availability	Maintain the distribution, abundance and availability of key food and prey items (e.g. crustacea, annelids, sandeel, herring, clupeidae) at preferred sizes.	Sandwich terns are effectively top predators of benthos, fish and shellfish populations and are considered likely to be of moderate sensitivity to habitat disturbance (Garthe & Hüppop, 2004; Bradbury *et al*., 2014). If seabed habitats (and therefore the prey species) are disturbed, the area may be temporarily devoid of any potential food sources, resulting in effective habitat loss. Furthermore, terns are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey from the sea surface. Activities associated with construction have the potential to release sediment into the water column during cable burial and associated works. Within Langstone Harbour, HDD will be used. The entry/exit points of the drill are expected to be onshore, thus there is no pathway for the works to result in an increase in suspended sediment or resultant smothering. Therefore, the works are not predicted to affect tern prey species in Langstone Harbour. Outside of Langstone Harbour, excavation at the marine HDD pits (KP 1.0-1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations) will transport the finest sediments up to 10 km from the release point. However, SSC at these distances will be low (< 5 mg/l) and therefore not discernible above natural variation, which ranges from approximately <5 to 75 mg/l in coastal areas. There will be no adverse effects on the availability of prey species at the Landfall since both habitat disturbance and increases in SSC will be temporary, short in duration and small in extent. Elsewhere within the Marine Cable Corridor, where foraging Sandwich tern densities may be lower (Wilson *et al*., 2014), the area of disturbed habitat for route preparation is anticipated to be a maximum of 3.6 km^2 along the entire Marine Cable Corridor (*c*.6%). Based on the predicted usage distributions presented in Wilson *et al*., (2014), high densities of breeding Sandwich terns are not expected beyond KP 21. Within the area of highest use (KP

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					0-21), it is predicted that a peak SSC of up to 200 mg/l may be observed locally (i.e. within 2 km of the cable trench/HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km from the cable trench/HDD pit at which point concentrations of 5 to 10 mg/l are predicted; SSC is expected to return to background levels within a few days following completion of these activities. Most prey species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, together with high background levels of suspended sediment in the Solent already (Guillou *et al*., 2017). During operation, within Langstone Harbour, it is considered that there is no pathway for impact due to the onshore nature of the cable crossing. Outside of Langstone Harbour during operation, there will be no adverse effect on the availability of prey species as a result of cable non-burial protection since these measures will be limited in spatial extent (*c*.0.7 km^2). During operation, repair or replacement of cables, although unlikely, may be required. An indicative worst-case failure rate of the Marine Cables could require a repair once every 10-12 years. Cable repair has the potential to have similar effects as during construction. However, potential increases in SSC would be lower than during construction due to the smaller scale of a repair, with works being of shorter duration and more localised, which will not result in any adverse effect on site integrity.. As such, the potential for effects from reduced prey availability resulting from seabed disturbance and increased turbidity from the Proposed Development alone will not result in any adverse effect on site integrity. Potential effects resulting from plans or projects which have temporal and spatial overlap with the Proposed Development (Table 4 of Appendix 3) are considered to be highly localised and temporary. As such, it is considered that there is no potential for adverse effects on site integrity from in combination effects on prey availability (see Appendix 1 PINS matrices for further details).

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
			Supporting habitat: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	Sandwich terns are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey. They are considered to be moderately sensitive to habitat disturbance (Bradbury *et al*., 2014). Activities associated with construction, repair and maintenance works have the potential to release sediment into the water column during cable installation and associated works e.g. HDD pit excavation. However, since HDD will be used within Langstone Harbour, with an onshore exit point, the volume of suspended material is considered to be negligible. Outside of Langstone Harbour, excavation at the marine HDD pits (KP 1.0-1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations) will transport the finest sediments up to 10 km from the release point. However, SSC at these distances will be low (< 5 mg/l) and therefore not discernible above natural variation, which ranges from approximately <5 to 75 mg/l in coastal areas. Elsewhere within the Marine Cable Corridor, where foraging Sandwich tern densities are likely to be much lower (Wilson *et al*., 2014), the area of disturbed habitat for route preparation is anticipated to be a maximum of 3.6 km^2 along the entire Marine Cable Corridor (*c*.6%). Based on the predicted usage distributions presented in Wilson *et al*., (2014), high densities of breeding Sandwich terns are not expected beyond KP 21. Within the area of highest use (KP 0-21), it is predicted that a peak SSC of up to 200 mg/l may be observed locally (i.e. within 2 km of the cable trench/HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km from the cable trench/HDD pit at which point concentrations of 5 to 10 mg/l are predicted; SSC is expected to return to background levels within a few days following completion of these activities. Most prey species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, together with high background levels of suspended sediment in the Solent already (Guillou *et al*., 2017). During operation, repair or replacement cables, although unlikely, may be required. An indicative worst-case failure

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					rate of the Marine Cables could require a repair once every 10-12 years. Cable repair has the potential to have similar effects as during construction. However, potential increases in SSC would be lower than during construction due to the smaller scale of a repair, with works being of shorter duration and more localised, which will not result in any adverse effect on site integrity. As such, the potential for effects from increased turbidity as a result of the Proposed Development alone will not result in any adverse effects on site integrity. Potential effects resulting from plans or projects which have temporal and spatial overlap with the Proposed Development (Table 4 of Appendix 3) are considered to be highly localised and temporary. As such, it is concluded that there is no potential for adverse effects on site integrity from in combination effects on prey species within the water column (see Appendix 1 PINS matrices for further details).
		Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect Sandwich terns utilising the sea surface through direct oiling resulting in mortality. Unplanned disposal of industrial or user plastic during all development phases also has the potential to cause Sandwich tern mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will prevent these events occurring and therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effects on site integrity from the Proposed Project alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Common tern	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Indirect effects	Supporting habitat: food availability	Maintain the distribution, abundance and availability of key food and prey items (e.g. crustacea, annelids, sandeel, herring, clupeidae) at preferred sizes.	Common terns are effectively top predators of benthos, fish and shellfish populations and are considered likely to be of moderate sensitivity to habitat disturbance (Garthe & Hüppop, 2004; Bradbury *et al.*, 2014). If seabed habitats (and therefore the prey species) are disturbed, the area may be temporarily devoid of any potential food sources,

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					resulting in effective habitat loss. Furthermore, terns are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey from the sea surface. Activities associated with construction have the potential to release sediment into the water column during cable installation and associated works. Within Langstone Harbour, HDD will be used. The entry/exit points of the drill are expected to be onshore, thus there is no pathway for the works to result in an increase in suspended sediment or resultant smothering. Therefore, the works are not predicted to affect tern prey species in Langstone Harbour. Outside of Langstone Harbour, excavation at the marine HDD pits (KP 1.0-1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations) will transport the finest sediments up to 10 km from the release point. However, SSC at these distances will be low (< 5 mg/l) and therefore not discernible above natural variation, which ranges from approximately <5 to 75 mg/l in coastal areas. There will be no adverse effects on the availability of prey speciesble since both habitat disturbance and increases in SSC will be temporary, short in duration and small in extent. Elsewhere within the Marine Cable Corridor, where foraging common tern densities may be lower (Wilson *et al*., 2014), the area of disturbed habitat for route preparation is anticipated to be a maximum of 3.6 km^2 along the entire Marine Cable Corridor (*c*.6%). Breeding common tern are not expected to be present beyond KP 21 in high densities, given their mean-maximum foraging range (15.2 km ± 11.2 km; Thaxter *et al*., 2012). Within this nearshore area (KP 0 – 21), it is predicted that a peak SSC of up to 200 mg/l may be observed locally (i.e. within 2 km of the cable trench/HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km from the cable trench/HDD pit at which point concentrations of 5 to 10 mg/l are predicted; SSC is expected to return to background levels within a few days following completion of these activities. Most prey species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					induced fluctuations in sediment concentrations, together with high background levels of suspended sediment in the Solent already (Guillou *et al*., 2017). During operation, within Langstone Harbour, it is considered that there is no pathway for impact due to the onshore nature of the cable crossing. Outside of Langstone Harbour during operation, there will be no adverse effect as a result of non-burial protection on prey availability since these measures will be limited in spatial extent (*c*.0.7 km^2). During operation, repair or replacement of cables, although unlikely, may be required. An indicative worst-case failure rate of the Marine Cables could require a repair once every 10-12 years. Cable repair has the potential to have similar effects as during construction . However, potential increases in SSC would be lower than during construction due to the smaller scale of a repair, the shorter duration and the more localised nature of work, with no adverse effects on site integrity. As such, the potential for effects from reduced prey availability resulting from seabed disturbance and increased turbidity from the Proposed Development alone is not considered to result in any adverse effects on site integrity. Potential effects resulting from plans or projects which have temporal and spatial overlap with the Proposed Development (Table 4 of Appendix 3) are considered to be highly localised and temporary. As such, it is considered that there will be no adverse effects on site integrity in combination with other plans and projects on prey availability (see Appendix 1 PINS matrices for further details).
			Supporting habitat: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	Common terns are visual foragers and are likely to be affected by an increase in turbidity which can make it harder to see prey. They are considered to be moderately sensitive to habitat disturbance (Bradbury *et al*., 2014). Activities associated with construction, repair and maintenance works have the potential to release sediment into the water column during cable installation and associated works e.g. HDD pit excavation. However, since HDD will be used within Langstone Harbour, with an onshore exit point, the volume of suspended material is considered to be negligible.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					Outside of Langstone Harbour, excavation at the marine HDD pits (KP 1.0-1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations) will transport the finest sediments up to 10 km from the release point. However, SSC at these distances will be low (< 5 mg/l) and therefore not discernible above natural variation, which ranges from approximately <5 to 75 mg/l in coastal areas. Elsewhere within the Marine Cable Corridor, where foraging common tern densities are likely to be much lower (Wilson *et al*., 2014), the area of disturbed habitat for route preparation is anticipated to be a maximum of 3.6 km^2 along the entire Marine Cable Corridor (c.6%). Breeding common tern are not expected to be present beyond KP 21 in high densities, given their mean-maximum foraging range (15.2 km ± 11.2 km; Thaxter *et al*., 2012). Within this nearshore area (KP 0 – 21), it is predicted that a peak SSC of up to 200 mg/l may be observed locally (i.e. within 2 km of the cable trench/HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km from the cable trench/HDD pit at which point concentrations of 5 to 10 mg/l are predicted; SSC is expected to return to background levels within a few days following completion of these activities. Most prey species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, together with high background levels of suspended sediment in the Solent already (Guillou *et al*., 2017). During operation, repair or replacement of cables, although unlikely, may be required. An indicative worst-case failure rate of the Marine Cables could require a repair once every 10-12 years. Cable repair has the potential to have similar effects as during construction. However, potential increases in SSC would be lower than during construction due to the smaller scale of a repair, the shorter duration and the more localised nature of work, with no adverse effect on site integrity. As such, the potential for effects from increased turbidity from the Proposed Development alone will not result in any adverse effects on site integrity.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					Potential effects resulting from plans or projects which have temporal and spatial overlap with the Proposed Development (Table 4 of Appendix 3) are considered to be highly localised and temporary. As such, it is considered that there will be no adverse effects on site integrity from in combination effects on prey species within the water column from increased turbidity (see Appendix 1 PINS matrices for further details).
		Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect common terns utilising the sea surface through direct oiling resulting in mortality. Unplanned disposal of industrial or user plastic during all development phases also has the potential to cause common tern mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will preventthese events occurring and therefore it is concluded that, in consideration of mitigation measures, there will be no adverse effects on site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is concluded that there will be no adverse effect on site integrity alone or in combination with other plans and projects.
Supporting habitat (water column)	Maintaining or restoring the extent, distribution, structure, function and supporting processes of the habitats of the qualifying features	Indirect effects	Supporting habitat: water quality - DO	Maintain the DO concentration at levels equating to High Ecological Status (specifically ≥ 5.7 mg per litre (at 35 salinity) for 95 % of the year), avoiding deterioration from existing levels.	DO levels affect the condition and health of supporting habitats. High turbidity can lead to a drop in DO, especially in warmer months. Low DO can have sub-lethal and lethal impacts on key prey species (Best *et al*., 2007) and hence can adversely affect the availability and suitability of qualifying feature feeding habitat. Activities associated with construction, repair and maintenance works have the potential to release sediment and increase turbidity during cable installation and associated works. However, since HDD will be used within Langstone Harbour, with an onshore exit point, the volume of suspended material is considered to be negligible. Outside of Langstone Harbour, excavation at the marine HDD pits (KP 1.0-1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					between KP 5 and 15, and in other isolated locations) will transport the finest sediments up to 10 km from the release point. However, SSC at these distances will be low (< 5 mg/l) and therefore not discernible above natural variation, which ranges from approximately <5 to 75 mg/l in coastal areas. Elsewhere within the Marine Cable Corridor, the area of disturbed habitat for route preparation is anticipated to be a maximum of 3.6 km^2 along the entire Marine Cable Corridor (*c*.6%). It is predicted that a peak SSC of up to 200 mg/l may be observed locally (i.e. within 2 km of the cable trench/HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km from the cable trench/HDD pit at which point concentrations of 5 to 10 mg/l are predicted; SSC is expected to return to background levels within a few days following completion of these activities. Most prey species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, together with high background levels of suspended sediment in the Solent already (Guillou *et al*., 2017). During operation, repair or replacement of cables, although unlikely, may be required. An indicative worst-case failure rate of the Marine Cables could require a repair once every 10-12 years. Cable repair has the potential to have similar effects as during construction, however, potential increases in SSC would be lower than during construction due to the smaller scale of a repair project, the shorter time-span of works and the more localised focus of work, with no adverse effects on site integrity. As such, the potential for impact on key prey species within the water column resulting from a drop in DO from the Proposed Development alone will not result in any adverse effects on site integrity. Potential effects resulting from plans or projects which have temporal and spatial overlap with the Proposed Development (Table 4 of Appendix 3) are considered to be highly localised and temporary. As such, it is considered that there will be no adverse effects on site integrity from in combination effects on prey

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					species within the water column from a drop in DO (see Appendix 1 PINS matrices for further details).
			Supporting habitat: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	A prolonged increase in turbidity through sediment release has a number of potential implications for prey species in the water column, such as affecting fish health and clogging the filtering organs of suspension feeding animals. This in turn can adversely affect the availability and suitability of qualifying feature feeding habitat. Activities associated with construction and maintenance works have the potential to release sediment and increase turbidity during cable installation and associated works. However, since HDD will be used within Langstone Harbour, with an onshore exit point, the volume of suspended material is considered to be negligible. Outside of Langstone Harbour, excavation at the marine HDD pits (KP 1.0-1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations) will transport the finest sediments up to 10 km from the release point. However, SSC at these distances will be low (< 5 mg/l) and therefore not discernible above natural variation, which ranges from approximately <5 to 75 mg/l in coastal areas. Elsewhere within the Marine Cable Corridor, the area of disturbed habitat for route preparation is anticipated to be a maximum of 3.6 km^2 along the entire Marine Cable Corridor (c.6%). It is predicted that a peak SSC of up to 200 mg/l may be observed locally (i.e. within 2 km of the cable trench/HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km from the cable trench/HDD pit at which point concentrations of 5 to 10 mg/l are predicted; SSC is expected to return to background levels within a few days following completion of these activities. Most prey species are able to tolerate a degree of suspended sediment owing to frequent exposure to storm induced fluctuations in sediment concentrations, together with high background levels of suspended sediment in the Solent already (Guillou *et al*., 2017).

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					During operation, repair or replacement of cables failure, although unlikely, may be required. An indicative worst-case failure rate of the Marine Cables could require a repair once every 10-12 years. Cable repair has the potential to have similar effects as during construction However, potential increases in SSC would be lower than during construction due to the smaller scale of a repair, the shorter duration and the more localised nature of work, with no adverse effects on site integrity. As such, the potential for impact on key prey species within the water column resulting from increased turbidity from the Proposed Development alone will not result in any adverse effects on site integrity. Potential effects resulting from plans or projects which have temporal and spatial overlap with the Proposed Development (Table 4 of Appendix 3) are considered to be highly localised and temporary. As such, it is considered that there will be no adverse effects on site integrity from in combination effects of increased turbidity from other plans and projects (see Appendix 1 PINS matrices for further details).
		Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect prey species within the water column through a range of biological effects. Unplanned disposal of industrial or user plastic during all development phases also has the potential to affect prey species through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will prevent these events occurring and therefore it is concluded that, in consideration of mitigation measures, there will be no adverse effects on site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Conclusion: No adverse effect on site integrity can be concluded, either from the Proposed Development alone, or in combination with other plans or projects, for the Solent and Dorset Coast SPA.					

10.5. ONSHORE AND MARINE: PORTSMOUTH HARBOUR SPA/RAMSAR SITE

10.5.1. OVERVIEW

10.5.1.1. Portsmouth Harbour is a large, industrialised estuary. Together with the adjacent Chichester and Langstone Harbours, it forms one of the most important sheltered intertidal areas on the south coast of England. The site is composed of extensive intertidal mudflats and sandflats with seagrass beds, areas of saltmarsh, shallow coastal waters, coastal lagoons and coastal grazing marsh (Natural England, 2019b).

10.5.1.2. At low tide the extensive mudflats are exposed, the water drained by channels and creeks uniting to form a narrow exit into the Solent. There is comparatively little freshwater input to Portsmouth Harbour. The largest input is the River Wallington, which flows into Fareham Creek in the north-west of Portsmouth Harbour. The estuarine sediments support rich populations of intertidal invertebrates, which provide an important food source for overwintering birds (Natural England, 2019b).

10.5.2. MARINE CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES)

10.5.2.1. Site-specific SACO is available for the Portsmouth Harbour SPA[46]. Table 10.7 lists those attributes which are considered to be equivalent to those impacts for which an LSE could not be excluded.

Table 10.1 – Marine SACO attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Red-breasted merganser **Supporting habitat (water column)**	Accidental spills and Litter	Supporting habitat: water quality - contaminants

10.5.2.2. Non-equivalent attributes listed within the SACO which were screened out from further assessment included:

- Breeding population: abundance;
- Connectivity with supporting habitats;
- Disturbance caused by human activity;
- Predation - all habitats;

[46]https://designatedsites.naturalengland.org.uk/Marine/FAPMatrix.aspx?SiteCode=UK9011051&SiteName=portsmouth harbour&SiteNameDisplay=Portsmouth+Harbour+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4 (Accessed August 2020)

- Supporting habitat: food availability;
- Supporting habitat: air quality;
- Supporting habitat: conservation measures;
- Supporting habitat: extent and distribution of supporting habitat for the breeding season;
- Supporting habitat: landform;
- Supporting habitat: vegetation characteristics for nesting;
- Supporting habitat: water quality – turbidity;
- Supporting habitat: water quality – DO; and
- Supporting habitat: water quality – nutrients.

10.5.3. ONSHORE CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES)

10.5.3.1. Table 10.8 lists those attributes which are considered to be equivalent to those impacts for which an LSE could not be excluded for the onshore environment.

Table 10.8 – OnshoreSACO attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent attribute
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
Supporting habitat (freshwater and coastal grazing marsh)	Indirect effects	Supporting habitat: extent and distribution of supporting habitat for the non-breeding season
	Accidental spills and Litter	Supporting habitat: food availability

10.5.4. ASSESSMENT OF POTENTIAL ADVERSE EFFECTS ON SITE INTEGRITY

10.5.4.1. For those designated features where no LSE could not be concluded, an assessment of potential adverse effects on site integrity is presented in Table 10.9 below.

10.5.4.2. Following the application of standard best practice mitigation measures, no adverse effect on site integrity, arising from the Proposed Development alone, or in combination with other plans or projects, can be concluded for the Portsmouth Harbour SPA/Ramsar site.

Table 10.9 – Marine assessment of potential adverse effects on site integrity for the Portsmouth Harbour SPA/Ramsar site across all phases of the Proposed Development both alone and in combination with other plans or projects.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Red-breasted merganser	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect prey species within the water column through a range of biological effects. Unplanned disposal of industrial or user plastic during all development phases also has the potential to affect prey species through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will prevent these events occurring and therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Supporting habitat (water column)	Maintaining or restoring the extent, distribution, structure, function and supporting processes of the habitats of the qualifying features.	Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect prey species within the water column through a range of biological effects. Unplanned disposal of industrial or user plastic during all development phases also has the potential to affect prey species through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will prevent events occurringand therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Conclusion: Following the application of standard best practice mitigation measures, no adverse effect on site integrity can be concluded, either from the Proposed Development alone, or in combination with other plans or projects, for the Portsmouth Harbour SPA/Ramsar site.					

Table 10.10 – Onshore assessment of potential adverse effects on site integrity for the Portsmouth Harbour SPA/Ramsar site across all phases of the Proposed Development both alone and in combination with other plans or projects.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Dark-bellied brent goose	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Disturbance and displacement	Disturbance caused by human activity	Reduce the frequency, duration and/or intensity of disturbance affecting roosting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed.	Dark-bellied brent goose is considered to be of high sensitivity to disturbance (Cutts *et al.,* 2013). Therefore, 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 dark-bellied brent geese at both roosting and foraging components of their daily cycle despite the industrial setting of the Proposed Development (SWBGS Steering Group, 2018). Owens (1977) describes the effects of anthropogenic disturbances on brent geese wintering on the Essex coast near the site of the then proposed London Airport at Maplin Sands. The report concluded that brent geese quickly became habituated to most sounds, but unexpected sounds, such as nearby gunshots from wildfowlers, usually put the geese to flight. Similarly, the first shots of the day at nearby army gunnery ranges caused the birds to leave the area, but they quickly returned and ignored all subsequent firings for that day. Extremely loud but regular bangs made during nearby weapon testing caused little reaction after the first few weeks. Specific surveys for this species for the Proposed Development recorded notable numbers in both intertidal and terrestrial (i.e. SWBGS) areas of the Study Area (APP-421). Furthermore, given the proximity of these areas to the Proposed Development, construction and decommissioning works are considered to have the potential to displace wintering dark-bellied brent goose from favoured foraging and roosting habitat through unpredictable noise events. Construction work within the SWBGS sites will reduce the availability of grassland foraging habitat where the construction stage overlaps with the winter season when dark-bellied brent geese and other wintering birds that are qualifying features of the SPA are present, October to March (Carboneras *et al.* 2019). Work within the sites during winter would produce direct disturbance of the sites from noise and movements of construction vehicles and machinery, further restricting the availability of remaining grassland within the sites as foraging areas. The following SWBGS sites overlap with onshore components of the Proposed Development: • 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. Effects of the construction stage on Chichester and Langstone Harbour SPA and its wintering intertidal bird community will be avoided by restricting works

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					within the winter season, defined as October to March (the period when SPA qualifying species such as dark-bellied brent goose arrive from their breeding grounds (Snow and Perrins, 1998). A detailed overview of the working restrictions were provided in Chapter 16: Onshore Ecology and Appendix 16.14: Winter Working Restriction for Features of Chichester & Langstone Harbours SPA (APP-421) and then subject to revisions following consultation with Natural England which are captured in the updated Outline Onshore CEMP (APP-505 Rev004). There are six principles that will be incorporated into working methods: . • **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 Proposed Developments Order Limits during October – March. An exception is the gravel car park within site P11 that is 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 Harbour 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 dBLAmax immediately adjacent to a major road and/or adjacent to industrial sites with notable levels (>60 dB) of existing noise can be undertaken unrestricted. It is considered that noise levels from the Proposed Development 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 69dbLAmax – 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). Adoption of Principle 1 (and reference to Principle 2) will offset direct effects on those SWBGS sites that lie within the Order Limits as detailed above (as these sites will not be subject to works in the winter period when they are used by SPA birds), and effects of noise and vibration on birds within the SPA itself.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					Adoption of Principle 1 (and reference to Principle 2) will ensure that there are no adverse effects on those SWBGS sites that lie within the Order Limits as detailed above (as these sites will not be subject to works in the winter period when they are used by SPA birds), and effects of noise and vibration on birds within the SPA itself. Trenching / road saw noise at 69dbLAmax has the potential to affect fourteen SWBGS sites. However, SWBGS sites P54 and P29 will not be adversely affected due to the minimal overlap of the site areas with noise exceeding 69 dB from trenching / road saw works. It is also considered that the buildings that are situated between the construction works and SWBGS sites will effectively buffer the noise so that in reality, there will be no overlap of noise effects. In consequence, these two sites are excluded from the restriction. In relation to the remaining 12 sites and adjacent areas of the SPA, although it considered likely that Principle 5 applies in this highly urbanised environment, construction work is restricted during October – March. The percussive activities at HDD compounds in proximity to the SWBGS sites are anticipated to comprise the insertion of sheet piles via an excavator mounted vibrator at HDD-1, HDD-2, HDD-3 and HDD-6 and via a piling rig for the reception pit at HDD-4. In accordance with the requirements of the OOCEMP, screening of at least 2 m high around the perimeter of the HDD compounds is required for the purpose of noise mitigation. Example screening solutions are presented in plate 6.1 of the OOCEMP (APP-505 Rev004). The benefit this screening affords has been included in 3D noise modelling for the HDD works in proximity to the SWBGS sites. Construction noise at over 69db LAmax as a result of this screening only occurs outside of the compounds for HDD-4 and HDD-6. The SPA is in an urban setting and recent research has established that visual disturbance does not have a significant impact on waterbirds in an estuary close to conurbations (Goss-Custard *et al*., 2019). The screening at the perimeter of HDD compounds will however also reduce visual disturbance to indistinguishable levels regardless of the baseline environment. With the combination of the seasonal restriction and mitigation measures the potential effects on dark-bellied brent goose resulting from disturbance and displacement from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) are considered to be localised and temporary.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					The North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL) includes a full winter working restriction (October – March) so will not disturb dark-bellied brent goose. Such restrictions have been adopted by other plans or projects 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). Potential overlap between the Proposed Development Order Limits and mitigation areas for the North Portsea Island Coastal Flood Defence Scheme Phase 4b would occur if the southern route option around Milton Common is taken. However, those compensation measures do not form part of the proposed mitigations/compensations to be provided in connection with the planning permission with reference 19/01368/FUL as per the most recent documents submitted to discharge the relevant planning conditions. As such, it is considered that there is no potential for adverse effects on site integrity from disturbance and displacement, either alone or in combination with other project and plans (for full details see Appendix 1 for the screening and integrity matrices for the SPA and Appendix 5 for the Ramsar site).
		Accidental spills and Litter	Supporting habitat: food availability	Maintain the distribution, abundance and availability of key food and prey items (e.g. *Zostera*, *Enteromorpha*,	Unplanned oil or chemical spillages may occur during the construction and decommissioning phases. Spills have the potential to directly affect dark-bellied brent geese utilising intertidal and other supporting habitats resulting in mortality. Unplanned disposal of industrial or user plastic during construction and decommissioning phases also has the potential to cause dark-bellied brent goose mortality through ingestion or entanglement. However, routine

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
				Ulva lactuca, *Spergularia*, *Puccinellia*, *Triglochin*, *Aster trifolium*, *Plantago*, *Salicornia* spp, *Agrostis stolonifera*, *Lolium perenne*, *Trifolium repens*) at preferred sizes.	mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and Material Resources of the ES APP-142) will ensure that these events are prevented and will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505 Rev004) and detail incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP'). The key matters of the SWMP are to: • 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. Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailedl CEMP specific to the works to be undertaken and agreed with relevant authority prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater (APP-134) and further captured in the Onshore Outline CEMP (APP-505 Rev004) 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. Therefore, it is considered that potential effects on dark-bellied brent goose resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) plus the North Portsea Island Coastal Flood Defence Scheme,

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL), are considered to be localised and temporary. Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (for full details see Appendix 1 for the screening and integrity matrices for the SPA and Appendix 5 for the Ramsar site).
Dunlin	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Accidental spills and Litter	Supporting habitat: food availability	Maintain the distribution, abundance and availability of key food and prey items (eg. *Nereis*, *Macoma*, *Hydrobia*, *Crangon*, *Carcinus*, dipertan flies, beetles, caddisfly, wasps, sawflies, mayflies) at preferred sizes.	Unplanned oil or chemical spillages may occur during the construction and decommissioning phases. Spills have the potential to directly affect dark-bellied brent geese utilising intertidal and other supporting habitats resulting in mortality. Unplanned disposal of industrial or user plastic during construction and decommissioning phases also has the potential to cause dark-bellied brent goose mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and Material Resources of the ES APP-142) will ensure that these events are prevented and will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505 Rev004) and detail incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP'). The key matters of the SWMP are to: • 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. Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailedl CEMP specific to the works to be undertaken and agreed with relevant authority prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater (APP-134) and further captured in the Onshore Outline CEMP (APP-505 Rev004) include:

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					• 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. Therefore, it is considered that potential effects on dark-bellied brent goose resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) plus the North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL), are considered to be localised and temporary. Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (for full details see Appendix 1 for the screening and integrity matrices for the SPA and Appendix 5 for the Ramsar site).
Black-tailed godwit	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Accidental spills and Litter	Supporting habitat: food availability	Maintain the distribution, abundance and availability of key food and prey items (eg. earthworm, leatherjacket, chironomids, *Macoma*, *Cardium*, *Nereis*) at preferred sizes.	Unplanned oil or chemical spillages may occur during the construction and decommissioning phases. Spills have the potential to directly affect dark-bellied brent geese utilising intertidal and other supporting habitats resulting in mortality. Unplanned disposal of industrial or user plastic during construction and decommissioning phases also has the potential to cause dark-bellied brent goose mortality through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (see Chapter 27: Waste and Material Resources of the ES APP-142) will ensure that these events are prevented and will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505 Rev004) and detail incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP'). The key matters of the SWMP are to: • 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;

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					• 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. Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailedl CEMP specific to the works to be undertaken and agreed with relevant authority prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater (APP-134) and further captured in the Onshore Outline CEMP (APP-505 Rev004) 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. Therefore, it is considered that potential effects on dark-bellied brent goose resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) plus the North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL), are considered to be localised and temporary. Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (for full details see Appendix 1 for the screening and integrity matrices for the SPA and Appendix 5 for the Ramsar site).

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Supporting habitat (freshwater and coastal grazing marsh)	Maintaining or restoring the extent, distribution, structure, function and supporting processes of the habitats of the qualifying features	Indirect effects	Supporting habitat: extent and distribution of supporting habitat for the non-breeding season	Restore the extent and distribution of suitable habitat (either within or outside the site boundary) which supports the feature for all necessary stages of the non-breeding/wintering period (moulting, roosting, loafing, feeding)	No habitat within the SPA/Ramsar site will be lost on either a permanent or temporary basis as a result of onshore construction / decommissioning activities. Several SWBGS sites do however lie within the Order Limits, namely: P08A, P11, P23A, P23B and P23R. SWBGS are areas that are of fundamental importance to over-wintering waterbirds in the Solent Region. SWBGS can be said to be functionally linked to the Special Protection Area (SPA) network including Chichester and Langstone Harbours SPA / Ramsar site. Construction work within these sites will result in temporary habitat loss to varying extents which would impact the availability of foraging and roosting resource to dark-bellied brent goose. Restoration measures will be implemented which require completion and grass sward re-established to provide a suitable food resource by October when brent geese return to the Solent to winter. The following two approaches are considered for restoration of SWBGS sites: • Re-seeding. Reinstate areas within SWBGS with grass seed before the end of May where practicable. This is the easiest and most cost effective option; • Re-turfing. Where not practicable to re-seed, turf will be laid and established. This is a more costly option but allows re-establishment and good sward growth in a shorter timescale. The choice of restoration approach is primarily dependent on the time available within the summer growing season for implementation. Re-seeding is not likely to be the optimal technique after May so that for any restoration works after this month, re-turfing would be implemented. These measures including details of site preparation, establishment and aftercare are provided in the revised Onshore Outline CEMP (APP-505 Rev004). P211, P23A and P23 R will be subject to re-turfing restoration within the appropriate timescales to allow reestablishment prior to October. P23B will be subject to either re-seeding or re-turfing. Components of P08A will not be restored until the month of October. However, no construction activities will take place on SWBGS sites in the non-breeding winter season so that visual and noise disturbance associated with these will not impact brent geese. National census data gathered by the British Trust for Ornithology (BTO) through their Wetland Bird Survey (WeBS) Scheme shows that numbers present in England during October are approximately 30% of those during the peak month of January. Additional important factors to consider include the amount of habitat that will require restoration in October and the proportion that it is of the SWBGS sites and the wider network. The October restoration area accounts for:

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					• 12 % of the P08A SWBGS; • 1.2 % of SWBGS core sites; and • 0.2 % of the entire SWBGS network. On this basis, it is determined that the restoration of 1.7 ha during the month of October would not impair the SWBGS network and specifically it would not impact the non-breeding brent goose population.Brent geese would not be disturbed and therefore the functionality of the P08A SWBGS would not be lost due to the extensive remaining habitat. Brent geese will still be able to utilise the majority of P08A SWBGS, which in itself forms just a small component of the SWBGS network available. This assessment is further supported by the fact that the loss of habitat will be temporary, covering at most 17% of a single non-breeding season and during a period when the majority of the Solent brent goose population would not be present. The P08A SWBGS will be restored it its entirety for in advance of when the peak numbers of geese are present in the region. Therefore, it is considered that potential indirect effects on supporting habitat resulting from temporary loss of functionally linked SWBGS from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424)) are considered to be localised and temporary. The North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL) includes a similar commitment to restore all SWBGS before the non-breeding season (October – March) so will not disturb dark-bellied brent goose. As such, it is considered that there is no potential for adverse effects on site integrity from indirect effects, either alone or in combination with other project and plans (for full details see Appendix 1 for the screening and intregrity matrices for the SPA and Appendix 5 for the Ramsar site).
		Accidental spills and Litter	Supporting habitat: extent and distribution of supporting habitat for the non-breeding season	Restore the extent and distribution of suitable habitat (either within or outside the site boundary) which supports the features for all necessary stages of	Unplanned oil or chemical spillages from construction activity may occur during construction and decommissioning phases. Spills have the potential to directly affect prey species within supporting habitats through a range of biological effects. Unplanned disposal of industrial plastic during all development phases also has the potential to affect prey species through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
				the non-breeding/wintering period (moulting, roosting, loafing, feeding) at: Intertidal Sediment = 831 Ha, Intertidal Seagrass = 77 Ha, Saltmarsh = 40 Ha, Freshwater and Coastal Grazing Marsh = 9 Ha and Coastal Lagoons = Unquantified.	(see Chapter 27: Waste and Material Resources of the ES APP-142) will ensure that these events are preventedand will therefore not result in an adverse effect. Measures detailed in Chapter 27 are summarised in the Onshore Outline CEMP (APP-505 Rev004) and detail incorporating a Materials Management Plan ('MMP') and Site Waste Management Plan ('SWMP'). The key matters of the SWMP are to: • 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. Best practice recommendations for the prevention of contamination will be outlined in more detail in a detailed CEMP specific to the works to be undertaken and agreed with relevant authority prior to commencement of construction works. Measures detailed in Chapter 19: Groundwater (APP-134) and further captured in the Onshore Outline CEMP 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. Therefore, it is considered that potential effects on supporting habitat resulting from accidental spills and/or litter from the Proposed Development alone will not result in an adverse effect on site integrity. Potential effects resulting from the limited plans or projects which have temporal and spatial overlap with the Proposed Development (APP-423 and APP-424) plus the North Portsea Island Coastal Flood Defence Scheme, Phase 4B - Coastline Between Milton Common and Kendall's Wharf Eastern Road (19/01368/FUL), are considered to be localised and temporary.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					Given the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is considered that there is no potential for adverse effects on site integrity from accidental spills and litter, either alone or in combination with other project and plans (for full details see the screening and integrity matrices at Appendix 1 for the SPA and Appendix 5 for the Ramsar site).
Conclusion: Following the application of standard best practice mitigation measures, no adverse effect on site integrity can be concluded, either from the Proposed Development alone, or in combination with other plans or projects, for the Portsmouth Harbour SPA/Ramsar site.					

10.6. MARINE: SOLENT AND SOUTHAMPTON WATER SPA/RAMSAR

10.6.1. OVERVIEW

10.6.1.1. The Solent and Southampton Water SPA is located in one of the only major sheltered channels in Europe, lying between a substantial island (the Isle of Wight) and the mainland, on the south coast of England. It stretches from Hurst Spit to Hill Head across Hampshire, and on the north coast of the Isle of Wight from Yarmouth to Whitecliff Bay (Natural England, 2019c).

10.6.1.2. This area is a complex major estuarine system consisting of coastal plain estuaries including the Yar, Medina, King's Quay Shore, and the Hamble. Bar-built estuaries including Newtown Harbour and Beaulieu also occupy the SPA. The Solent and its inlets are unique in Britain and Europe for their unusual tidal regime, including double tides and long periods of tidal stand at high and low tide (Natural England, 2019c).

10.6.1.3. The Solent and Southampton Water is composed of extensive intertidal mudflats and sandbanks, inter- and subtidal rock, areas of saltmarsh, coastal lagoons, coastal reed beds, shingle banks, and grazing marsh.

10.6.1.4. The shingle banks also provide important breeding grounds for terns.

10.6.2. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES)

10.6.2.1. Site-specific SACO is available for the Solent and Southampton Water SPA[47]. Table 10.11 lists those attributes which are considered to be equivalent to those impacts for which an LSE could not be excluded.

Table 10.11- SACO attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Little tern **Sandwich tern** **Common tern** **Roseate tern** **Supporting habitat (water column)**	Accidental spills and Litter	Supporting habitat: water quality - contaminants

10.6.2.2. Non-equivalent attributes listed within the SACO which were screened out from further assessment included:

[47]https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9011061&SiteName=solent&SiteNameDisplay=Solent+and+Southampton+Water+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=9 (Accessed October 2019)

- Breeding population: abundance;
- Connectivity with supporting habitats;
- Disturbance caused by human activity;
- Predation - all habitats;
- Supporting habitat: food availability;
- Supporting habitat: air quality;
- Supporting habitat: conservation measures;
- Supporting habitat: extent and distribution of supporting habitat for the breeding season;
- Supporting habitat: landform;
- Supporting habitat: vegetation characteristics for nesting;
- Supporting habitat: water quality – turbidity;
- Supporting habitat: water quality – DO; and
- Supporting habitat: water quality – nutrients.

10.6.3. ASSESSMENT OF POTENTIAL ADVERSE EFFECTS ON SITE INTEGRITY

10.6.3.1. For those designated features where no LSE could not be concluded, an assessment of potential adverse effects on site integrity is presented in Table 10.12 below.

10.6.3.2. Following the application of standard best practice mitigation measures, no adverse effect on site integrity, arising from either the Proposed Development alone, or in combination with other plans or projects, can be concluded for the Solent and Southampton Water SPA/Ramsar site.

Table 10.12 Assessment of potential adverse effects on site integrity for the Solent and Southampton Water SPA/Ramsar site across all phases of the Proposed Development both alone and in combination with other plans or projects

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Little tern	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect prey species within the water column through a range of biological effects. Unplanned disposal of industrial or user plastic during all development phases also has the potential to affect prey species through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will preventthese events occurringand therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Sandwich tern	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect prey species within the water column through a range of biological effects. Unplanned disposal of industrial or user plastic during all development phases also has the potential to affect prey species through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will prevent these events occurringand therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Common tern	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect prey species within the water column through a range of biological effects. Unplanned disposal of industrial or user plastic during all development phases also has the potential to affect prey species through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will prevent these events occurring and therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Roseate tern	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect prey species within the water column through a range of biological effects. Unplanned disposal of industrial or user plastic during all development phases also has the potential to affect prey species through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will prevent these events occurring and therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Mediterranean gull	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect prey species within the water column through a range of biological effects. Unplanned disposal of industrial or user plastic during all development phases also has the potential to affect prey species through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will prevent these events occurring and therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Supporting habitat (water column)	Maintaining or restoring the extent, distribution, structure, function and supporting processes of the habitats of the qualifying features.	Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect prey species within the water column through a range of biological effects. Unplanned disposal of industrial or user plastic during all development phases also has the potential to affect prey species through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will prevent these events occurringand therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Conclusion: Following the application of standard best practice mitigation measures, no adverse effect on site integrity, arising either from the Proposed Development alone, or in combination with other plans or projects, can be concluded for the Solent and Southampton Water SPA/Ramsar site.					

10.7. MARINE: PAGHAM HARBOUR SPA/RAMSAR SITE

10.7.1. OVERVIEW

10.7.1.1. Pagham Harbour SPA lies between Bognor Regis and Chichester in West Sussex. The many natural habitats contained within and around the small harbour support a notable abundance of wildlife. The estuarine basin is made up of an extensive central area of saltmarsh and intertidal mud-flats, surrounded by lagoons, shingle, open water, reed swamp and wet permanent grassland. The mud-flats are rich in invertebrates and algae, and provide important feeding areas for the many bird species that use the site (Natural England, 2019d). The local RSPB have managed the site as a local nature reserve ('LNR') since 2013, amplifying the productivity and variety of species present.

10.7.1.2. Terns breed on the shingle habitats near the harbour entrance and depart on foraging trips to the coastal waters (Natural England, 2019d).

10.7.2. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES)

10.7.2.1. Site-specific SACO is available for the Pagham Harbour SPA[48]. Table 10.13 lists those attributes which are considered to be equivalent to those impacts for which an LSE could not be excluded.

Table 10.2- SACO attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Common tern **Supporting habitat (water column)**	Accidental spills and Litter	Supporting habitat: water quality - contaminants

10.7.2.2. Non-equivalent attributes listed within the SACO which were screened out from further assessment included:

- Breeding population: abundance;
- Connectivity with supporting habitats;
- Disturbance caused by human activity;
- Predation - all habitats;
- Supporting habitat: food availability;
- Supporting habitat: air quality;

[48] https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9012041&SiteName=pagham&SiteNameDisplay=Pagham+Harbour+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4 (Accessed October 2019)

- Supporting habitat: conservation measures;
- Supporting habitat: extent and distribution of supporting habitat for the breeding season;
- Supporting habitat: landform;
- Supporting habitat: vegetation characteristics for nesting;
- Supporting habitat: water quality – turbidity;
- Supporting habitat: water quality – DO; and
- Supporting habitat: water quality – nutrients.

10.7.3. ASSESSMENT OF POTENTIAL ADVERSE EFFECTS ON SITE INTEGRITY

10.7.3.1. For those designated features where no LSE could not be concluded, an assessment of potential adverse effects on site integrity is presented in Table 10.14 below.

10.7.3.2. Following the application of standard best practice mitigation measures, no adverse effect on site integrity, arising from either the Proposed Development alone, or in combination with other plans or projects, can be concluded for the Pagham Harbour SPA/Ramsar site.

Table 10.3 - Assessment of potential adverse effects on site integrity for the Pagham Harbour SPA/Ramsar site across all phases of the Proposed Development both alone and in combination with other plans or projects

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Common tern	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect prey species within the water column through a range of biological effects. Unplanned disposal of industrial or user plastic during all development phases also has the potential to affect prey species through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will prevent these events occurringand therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Supporting habitat (water column)	Maintaining or restoring the extent, distribution, structure, function and supporting processes of the habitats of the qualifying features.	Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect prey species within the water column through a range of biological effects. Unplanned disposal of industrial or user plastic during all development phases also has the potential to affect prey species through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will prevent these events occurring and therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Conclusion: Following the application of standard best practice mitigation measures, no adverse effect on site integrity can be concluded, either from the Proposed Development alone, or in combination with other plans or projects, for the Pagham Harbour SPA/Ramsar site.					

10.8. MARINE: LITTORAL SEINO-MARIN SPA

10.8.1. OVERVIEW

10.8.1.1. The Littoral Seino-Marin SPA stretches along approximately 70 km of coastline of the coast of Haute-Normandie, from the port of Antifer to Cap d'Ailly. To the west of Veulettes sur mer, the site includes cliff, beach, and foreshore, extending seawards to the limit of French waters (12 nmi). The area east of Veulettes-sur-Mer is entirely marine, extending from the MLWS mark to the limit of French waters.

10.8.1.2. The major ecological interest is the presence of large numbers of seabirds, with two main colonies of breeding seabirds at Cap d'Antifer and Cap Fagnet. The site hosts significant numbers of fulmar, cormorant, herring gull and lesser black-backed gull. In addition, the SPA is home to the majority of shag, kittiwake and great black-backed gull nesting on the coast of the Pays de Caux. The cliffs at Cap Fagnet host more than 400 pairs of black-legged kittiwake, which represent nearly half of the breeding population of Haute-Normandie and is one of 10 sites that together host 90% of the French breeding population. Forty-two pairs of fulmars are also present at Cap Fagnet, representing a large proportion of the Upper Normandy population.

10.8.1.3. The Littoral Seino-Marin SPA also hosts nationally and internationally important numbers of inshore wintering waterfowl (including grebes, divers and auks), as well as migratory seabirds, including terns, gulls and gannets.

10.8.2. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES)

10.8.2.1. Site-specific SACO is not available for the Littoral Seino-Marin SPA. As such, SACO available for the UK SPAs considered have been used as a basis for the assessment. Table 10.15 lists those attributes which are considered to be equivalent to those impacts for which an LSE could not be excluded.

Table 10.4 - SACO attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Fulmar **Kittiwake** **Herring gull** **Great black-backed gull**	Accidental spills and Litter	Supporting habitat: water quality - contaminants

10.8.2.2. Non-equivalent attributes listed within the SACO which were screened out from further assessment included:

- Breeding population: abundance;
- Connectivity with supporting habitats;

- Disturbance caused by human activity;
- Predation - all habitats;
- Supporting habitat: food availability;
- Supporting habitat: air quality;
- Supporting habitat: conservation measures;
- Supporting habitat: extent and distribution of supporting habitat for the breeding season;
- Supporting habitat: landform;
- Supporting habitat: vegetation characteristics for nesting;
- Supporting habitat: water quality – turbidity;
- Supporting habitat: water quality – DO; and
- Supporting habitat: water quality – nutrients.

10.8.3. ASSESSMENT OF POTENTIAL ADVERSE EFFECTS ON SITE INTEGRITY

10.8.3.1. For those designated features where no LSE could not be concluded, an assessment of potential adverse effects on site integrity is presented in Table 10.16 below.

10.8.3.2. Following the application of standard best practice mitigation measures, no adverse effect on site integrity, arising from either the Proposed Development alone, or in combination with other plans or projects, can be concluded for the Littoral Seino Marine SPA.

Table 10.5- Assessment of potential adverse effects on site integrity for the Littoral Seino-Marin SPA across all phases of the Proposed Development both alone and in combination with other plans or projects

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Fulmar	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect prey species within the water column through a range of biological effects. Unplanned disposal of industrial or user plastic during all development phases also has the potential to affect prey species through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will prevent these events occurringand therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Kittiwake	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect prey species within the water column through a range of biological effects. Unplanned disposal of industrial or user plastic during all development phases also has the potential to affect prey species through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will prevent these events occurringand therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Herring gull	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect prey species within the water column through a range of biological effects. Unplanned disposal of industrial or user plastic during all development phases also has the potential to affect prey species through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will prevent these events occurring and therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Great black-backed gull	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect prey species within the water column through a range of biological effects. Unplanned disposal of industrial or user plastic during all development phases also has the potential to affect prey species through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will prevent these events occurringand therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Conclusion: Following the application of standard best practice mitigation measures, no adverse effect on site integrity can be concluded for the Littoral Seino-Marin SPA, arising from either the Proposed Development alone, or in combination with other plans or projects.					

10.9. MARINE: ALDERNEY WEST COAST AND BURHOU ISLANDS RAMSAR SITE

10.9.1. OVERVIEW

10.9.1.1. The Alderney West and Burhou Islands Ramsar site covers some 4.4 nm^2 of land and sea, almost twice the land area of mainland Alderney. The site comprises the western coast of Alderney and adjacent shallow waters and islets in the strongly tidal, high-energy system of the northern Channel Islands.

10.9.1.2. Large breeding seabird populations are present within the site, including the only storm petrel and gannet colonies in the Channel Islands. The gannet colony is established on the Garden Rocks (Les Etacs) and Ortac. At the time of designation in 2005, 5,950 breeding pairs were present, with 8,737 pairs present during the last count in 2015 (Copping *et al*., 2018).

10.9.1.3. Other breeding seabird species are present in regionally, nationally and internationally important numbers, with most present on the Burhou Islands.

10.9.2. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES)

10.9.2.1. Site-specific SACO is not available for the Alderney West Coast and Burhou Islands Ramsar site. As such, SACO available for the UK SPAs considered have been used as a basis for the assessment. Table 10.17 lists those attributes which are considered to be equivalent to those impacts for which an LSE could not be excluded.

Table 10.6 SACO attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Gannet **Storm petrel** **Lesser black-backed gull**	Accidental spills and Litter	Supporting habitat: water quality - contaminants

10.9.2.2. Non-equivalent attributes listed within the SACO which were screened out from further assessment included:

- Breeding population: abundance;
- Connectivity with supporting habitats;
- Disturbance caused by human activity;
- Predation - all habitats;
- Supporting habitat: food availability;
- Supporting habitat: air quality;

- Supporting habitat: conservation measures;
- Supporting habitat: extent and distribution of supporting habitat for the breeding season;
- Supporting habitat: landform;
- Supporting habitat: vegetation characteristics for nesting;
- Supporting habitat: water quality – turbidity;
- Supporting habitat: water quality – DO; and

10.9.2.3. Supporting habitat: water quality – nutrients.

10.9.3. ASSESSMENT OF POTENTIAL ADVERSE EFFECTS ON SITE INTEGRITY

10.9.3.1. For those designated features where no LSE could not be concluded, an assessment of potential adverse effects on site integrity is presented in Table 10.18 below.

10.9.3.2. Following the application of standard best practice mitigation measures, no adverse effect on site integrity, arising from either the Proposed Development alone, or in combination with other plans or projects, can be concluded for the Alderney West Coast and Burhou Islands Ramsar site.

Table 10.18 - Assessment of potential adverse effects on site integrity for the Alderney West and Burhou Islands Ramsar site across all phases of the Proposed Development both alone and in combination with other plans or projects

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Gannet	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect prey species within the water column through a range of biological effects. Unplanned disposal of industrial or user plastic during all development phases also has the potential to affect prey species through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will prevent these events occurring and therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Storm petrel	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect prey species within the water column through a range of biological effects. Unplanned disposal of industrial or user plastic during all development phases also has the potential to affect prey species through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will prevent these events occurring and therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Lesser black-backed gull	Maintaining or restoring the populations of qualifying features, and the distribution of qualifying features within the site.	Accidental spills and Litter	Supporting habitat: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect prey species within the water column through a range of biological effects. Unplanned disposal of industrial or user plastic during all development phases also has the potential to affect prey species through ingestion or entanglement. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures and strict navigational protocols will prevent these events ocurring and therefore it is predicted that, in consideration of mitigation measures, there will be no adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Conclusion: Following the application of standard best practice mitigation measures, no adverse effect on site integrity can be concluded for the Alderney West Coast and Burhou Islands Ramsar site, either from the Proposed Development alone, or in combination with other plans or projects.					

10.10. MARINE: SOLENT MARITIME SAC

10.10.1. OVERVIEW

10.10.1.1. The Solent Maritime SAC covers 113.25 km^2 throughout the Solent as well as Langston Harbour and Chichester Harbour. The SAC overlaps with the Marine Cable Corridor for over an area of 163.4 m^2 at the mouth of Langston Harbour. Designated features for which LSE could not be ruled out within this SAC were Estuaries [1130], Sandbanks which are slightly covered by sea water all the time [1110], and mudflats and sandflats not covered by seawater at low tide [1140], Spartina swards [1320], Atlantic salt meadows [1330], and Salicornia and other annuals colonising mud and sand [1310].

10.10.2. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES)

10.10.2.1. Site-specific SACO is available for the Solent Maritime SAC[49].

10.10.2.2. Table 10.19 lists those attributes which are considered to be relevant to those effects for which an LSE could not be excluded.

49 https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK0030059&SiteName=solent&SiteNameDisplay=Solent+Maritime+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=0 Accessed October 2019

Table 10.19 - SACO attributes screened in for assessment

Feature/Sub-feature	Effect for which LSE could not be excluded	Equivalent attribute
Estuaries	Increased suspended sediment concentration (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 Structure: species composition of component communities Structure: substrate composition and distribution
Atlantic Salt Meadows **Salicornia and other annuals colonising mud and sand** **Spartina swards**	Increased suspended sediment concentration (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
Intertidal Course Sediment **Intertidal mixed sediment** **Intertidal mud** **Intertidal sand and muddy sand**	Increased suspended sediment concentration (SSC) Deposition of sediment (smothering)	Structure: sediment total organic carbon ('TOC') content 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 Structure: species composition of component communities Structure: substrate composition and distribution
Intertidal seagrass beds **Subtidal seagrass beds**	Increased suspended sediment concentration (SSC) Deposition of sediment (smothering)	Supporting processes: sedimentation rate Supporting Processes: water quality – DO Supporting Processes: water quality – nutrients Supporting Processes: water quality – turbidity Distribution: presences and spatial distribution of biological communities Structure: species composition of component communities Structure: substrate composition and distribution
Sandbanks which are slightly covered by seawater all the time **Subtidal course sediment** **Subtidal mixed sediment** **Subtidal sand**	Increased suspended sediment concentration (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: presences and spatial distribution of biological communities Structure: species composition of component communities Structure: substrate composition and distribution
Mudflats and sandflats not covered by seawater at low tide	Increased suspended sediment concentration (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 Structure: species composition of component communities

Feature/Sub-feature	Effect for which LSE could not be excluded	Equivalent attribute
Estuaries **Mudflats and sandflats not covered by seawater at low tide** **Sandbanks which are slightly covered by seawater all the time.** **Subtidal seagrass beds** **Subtidal sand** **Subtidal mixed sediment** **Subtidal course sediment** **Intertidal seagrass beds** **Intertidal sand and muddy sand** **Intertidal mud** **Intertidal mixed sediment** **Intertidal course sediment**	Pollution	Supporting processes: sediment contaminants Supporting processes: water quality – contaminants
Spartina swards **Salicornia and other annuals colonising mud and sand** **Atlantic salt meadows**	Pollution	Supporting processes: water quality
Estuaries **Mudflats and sandflats not covered by seawater at low tide** **Sandbanks which are slightly covered by seawater all the time.** **Subtidal seagrass beds** **Subtidal sand** **Subtidal mixed sediment** **Subtidal course sediment** **Intertidal seagrass beds** **Intertidal sand and muddy sand** **Intertidal mud** **Intertidal mixed sediment** **Intertidal course sediment**	Invasive species	Structure: non-native species and pathogens
Spartina swards **Salicornia and other annuals colonising mud and sand** **Atlantic salt meadows**	Invasive species	Structure and function: vegetation – undesirable species

10.10.2.3. All other attribute/receptor combinations present within the SACO for this SAC were deemed to not be relevant to the effects screened into the AA.

10.10.2.4. The assessment for potential adverse effects on integrity for the Solent Maritime SAC (Table 10.20) is undertaken on all relevant sub-features, noting that the same sub-features may be present in more than one qualifying feature of the site. The Conservation Objectives, targets and attributes of each sub-feature are the same across all qualifying features. It is noted that Salicornia and other annuals colonising mud and sand, *Spartina* swards, and Atlantic salt meadows are qualifying features as well as being sub-features of the Estuary qualifying feature. Where qualifying features are also sub-features, the conservation objectives, attributes and targets are the same whether at a sub-feature or qualifying feature level.

10.10.3. ASSESSMENT OF POTENTIAL ADVERSE EFFECTS ON SITE INTEGRITY

10.10.3.1. For those designated features where LSE could not be excluded in Section 7, an assessment of potential adverse effects on site integrity is presented in Table 10.20 below.

10.10.3.2. It is concluded that there will be no adverse effect on site integrity for the Solent Maritime SAC, either from the Proposed Development alone, or in combination with other plans or projects, following the application of mitigation.

Table 10.20 - Assessment of potential adverse effects on site integrity for the Solent Maritime SAC across all phases of the Proposed Development

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
Estuaries	Maintaining or restoring: The extent and distribution of qualifying natural habitats and habitats of the qualifying species	Invasive species	Structure: non-native species and pathogens	Reduce the introduction and spread of non-native species and pathogens, and their impacts.	Application of best practice plans and procedures (see section 10.2.5) will be followed by all contractors and vessels. This will reduce the potential for introduction of INIS introduction as far as is reasonably practicable and will ensure that there will be no adverse effects on the integrity of the site as a result of invasive species. Due to the lack of predicted effects, along with the application of any similar best practice measures employed for any other plan and project identified, it is concluded that no in combination adverse effects on site integrity will arise on this feature as a result of invasive species.
	The structure and function (including typical species) of qualifying natural habitats The structure and function of the habitats of the qualifying species	Pollution	Supporting Processes: sediment contaminants	Restrict surface sediment contaminant levels to concentrations where they are not adversely impacting the infauna of the feature (or its sub-features).	Unplanned oil or chemical spillages from vessels may occur during all development phases. However, routine mitigation measures of standard best practice in terms of waste management, polution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on Site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effects on site integrity in combination with other plans and projects.
	The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely	Pollution	Supporting Processes: water quality – contaminants	Reduce aqueous contaminants to levels equating to High/Good Status (according to Annex VIII and X of the WFD), avoiding deterioration from existing levels.	
	The populations of each of the qualifying species The distribution of	Increased SSC	Supporting Processes: water quality - DO	Maintain the DO concentration at levels equating to High Ecological Status (specifically ≥ 5.7 mg L-1 (at 35 salinity) for 95 % of year) avoiding deterioration from existing levels	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2 of ES) show that, at this distance, there will be no connectivity between increased SSC / sediment plumes and the SAC resulting from the disposal of dredge material. For activities in addition to the deposition of dredged material, the worst-case activities which will lead to increased SSC are considered to be the excavation at the HDD pit(s) (between KP1 and KP1.6), and cable installation (due to the

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
	qualifying species within the site	Increased SSC	Supporting Processes: water quality – nutrients	Restore water quality to mean winter dissolved inorganic nitrogen levels at which biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms) do not affect the integrity of the site and features.	potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations). Peak SSCs levels of up to 200 mgl^{-1} will be observed locally (i.e. within 2 km of the cable trench or HDD pit) with these concentrations persisting for several hours following completion of construction activities. Sediment plumes will be to be transported up to 5 km away from the trench or pit at which point concentrations will be in the range of 5 to 10 mgl^{-1}. SSC levels will return to background levels within a few days following completion of these activities. The finest sediments will be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl^{-1}) and therefore not discernible above natural variations in background SSCs. Natural variations in SSC ranges from approximately <5 to 75 mgl^{-1} in coastal areas, with annual averages of between 5 – 15 mgl^{-1} observed within surface waters. The mouth of Langstone harbour (the closest Estuary feature within the SAC) is approximately 1 km from the proposed HDD entry/exit pits (at its closest possible location). SSC variability within the harbour is high, owing to its tidal nature and frequent exposure to storm induced fluctuations (New Forest District Council, 2017). Suspended sediments within Langstone harbour have been measured at 200 mgl^{-1}(Humby and Dunn, 1975 – cited in New Forest District Council, 2017), therefore, the peak SSCs resulting from the Proposed Development would not exceed natural levels of variation within the estuary at Langstone Harbour. In addition, estuarine qualifying feature habitats present within the SAC, are not considered sensitive to this pressure (see sub-feature assessments below), and are highly tolerant to the levels of increased SSC as a result of the Proposed Development which will only persist for a short duration. Therefore, there will be no adverse effects on site integrity resulting from the Proposed Development alone from increased SSC on estuary features. Negligible effects on the natural levels of turbidity, DO, or nutrients are predicted following cessation of the activity, and no effects on inorganic nitrogen levels are predicted. Considering the indiscernible effects predicted by the Proposed Development alone, the general lack of sensitivity to the impact, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination increases in SSC.
		Increased SSC	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of estuary communities.	
		Increased SSC	Structure: species composition of component communities	Restore the Species composition of component communities.	
		Increased SSC	Supporting Processes: water quality – turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
		Deposition of Sediment (Smothering)	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of estuary communities.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km); which equates to disposal seaward of KP21 of the Marine Cable Corridor. Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there will be no sediment deposition within the SAC resulting from dredge disposal activities. Deposition from other cable installation activities (including excavation of HDD pits between KP1 and KP1.6) will not be significant, with any coarse material mobilised deposited rapidly (i.e. within several hundred metres of the cable trench). Finer sediment will be dispersed across a greater spatial extent, transiently depositing throughout the tidal cycle. However, due to the low volumes of sediment likely to be liberated into the water column and significant dispersion of fine sediment, it is considered that there will be no discernible deposition with sediments quickly resuspended and redistributed under the forcing of tidal flows. The mouth of Langstone harbour (the closest Estuary feature within the SAC) is approximately 1 km from the proposed HDD entry/exit pits (at their closest possible location), and therefore it is considered that it will be outwith the area where the majority of sediment is deposited. Therefore, any deposition of sediment resulting from the Proposed Development alone will be 'light', temporary in nature and will not adversely affect the integrity of the Estuary feature, most of the habitats of which are not sensitive to effects at this level. No discernible effects on normal sediment and water movement, or sediment composition are predicted. Considering the indiscernibleeffects predicted to result from the Proposed Development alone, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will not be an adverse effect on site integrity from in combination deposition of sediment (smothering).
		Deposition of Sediment (Smothering)	Structure: species composition of component communities	Restore the Species composition of component communities.	
		Deposition of Sediment (Smothering)	Structure: substrate composition and distribution	Maintain the distribution, composition and character of substrate across the feature (and each of its subfeatures).	
Atlantic Salt Meadows (*Glauco-Puccinellietalia*)	Maintaining or restoring: The extent and distribution of qualifying natural habitats and habitats of the qualifying	Invasive species	Structure and function: vegetation - undesirable species	The frequency / cover of the following undesirable species are maintained at acceptable levels and are not encouraged by changes in surface condition, soils, nutrient levels or changes to	Application of best practice plans and procedures (see section 10.2.5) will be followed by all contractors and vessels. This will reduce the potential for introduction of INIS introduction as far as is reasonably practicable and will ensure that there will be no adverse effects on the integrity of the site as a result of invasive species. Due to the lack of predicted effects, along with the application of any similar best practice measures employed for any other plan and project identified, it is

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
	species The structure and function (including typical species) of qualifying natural habitats The structure and function of the habitats of the qualifying species The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely The populations of each of the qualifying species The distribution of qualifying species within the site			hydrology: Spartina anglica, Phragmites australis.	concluded that no in combination adverse effects on site integrity will arise on this feature as a result of invasive species.
		Increased SSC	Distribution of the feature, including associated transitional habitats, within the site	Maintain the range and continuity of the habitat and its natural transitions within saltmarsh types and to other habitats seaward and landward.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2) indicate that, at this distance, there will be no connectivity for increased SSC / sediment plumes with the SAC. For activities other than the deposition of dredged material, the worst-case activities which will lead to increased SSC are considered to be excavation at the HDD pits, and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations). It is predicted that peak SSCs of up to 200 mgl-1 may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl-1 are predicted. SSC is expected to return to background levels within a few days following completion of these activities. The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl-1) and therefore not discernible above natural variation. Natural variation ranges from approximately <5 to 75 mgl-1 in coastal areas, with annual averages of between 5 – 15 mgl-1 observed within surface waters. The mouth of Langstone harbour (the closest Estuary feature within the SAC) is approximately 1 km from the proposed HDD entry/exit pits (at their closest possible location), and the closest areas of saltmarsh habitat is located a further kilometre from the entrance. SSC variability within the harbour is high, owing to its tidal nature and frequent exposure to storm induced fluctuations (New Forest District Council, 2017). Suspended sediments within Langstone harbour have been measured at 200 mgl-1, while measured SSC in nearby harbours have been recorded up to 100 mgl-1 (Portsmouth) (Humby and Dunn, 1975 – cited in New Forest District Council, 2017).
		Increased SSC	Extent of the feature within the site	Restore the total extent of saltmarsh features to at least 1,095 hectares.	
		Increased SSC	Future extent of habitat within the site and ability to respond to seasonal changes	Maintain the ability to achieve long-term fluctuations in the extent of habitat in response to coastal processes.	
		Increased SSC	Structure and function (including its typical species): key structural, influential and distinctive species	Maintain the abundance of the species listed to enable each of them to be a viable component of the Annex I habitat feature	
		Increased SSC	Structure and function: sediment size and availability	Maintain the availability and size range of those sediments typical of the feature at the site.	
		Increased SSC	Supporting Processes: functional connectivity with wider coastal sedimentary system	Maintain adequate inputs of sediment in the water column from the sediment sources	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
				(offshore / eroding cliffs, etc).	Saltmarsh plants are tolerant of a degree of increased SSC, and the resulting turbidity. It is recognised that turbidity reduces the light attenuation through water, however the plants photosynthesise at low tide Any species covered by high tide, that experience reduced photosynthesis, will be able compensate when exposed to air and low tides (Tyler Walters, 2004). Therefore, the slight increases in SSC predicted to arise from the Proposed Development alone will not affect the growth or distribution of Atlantic salt meadows within the Solent Maritime SAC and no adverse effects on integrity are predicted. No effect on the natural levels of turbidity are predicted following cessation of the activity, and negligible effects on sediment composition or the ability of this feature to transition or fluctuate in extent are predicted. Considering the indiscernibleeffects predicted for the Proposed Development alone, the general lack of sensitivity to the impact, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity as a result of increases in SSC, either alone or in combination with other plans and projects.
		Deposition of sediment (Smothering)	Supporting Processes: sedimentary Processes	Maintain the sedimentary processes (suspended sediment, sediment transfer, etc) that sustain the elevation and topography of the marsh surface.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2) indicate that, at this distance, there will be no connectivity for sediment deposition with the SAC. Deposition from other cable installation activities (including excavation of HDD pits) is not predicted to be significant with any coarse material mobilised deposited rapidly (i.e. within several hundred metres of the cable trench). Finer sediment will be dispersed across a greater spatial extent, transiently depositing throughout the tidal cycle. However, due to the volumes of sediment likely to be liberated into the water column and significant dispersion of fine sediment, it is considered that deposition will be negligible with sediments quickly resuspended and redistributed under the forcing of tidal flows. The mouth of Langstone harbour (the closest Estuary feature within the SAC) is approximately 1 km from the proposed HDD entry/exit pits (at their closest possible location), and the closest areas of saltmarsh habitat is located a further kilometre from the entrance. Therefore, any deposition of sediment will be light, and likely
		Deposition of Sediment (Smothering)	Distribution of the feature, including associated transitional habitats, within the site	Maintain the range and continuity of the habitat and its natural transitions within saltmarsh types and to other habitats seaward and landward.	
		Deposition of Sediment (Smothering)	Extent of the feature within the site	Restore the total extent of saltmarsh features to at least 1,095 hectares.	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
		Deposition of Sediment (Smothering)	Future extent of habitat within the site and ability to respond to seasonal changes	Maintain the ability to achieve long-term fluctuations in the extent of habitat in response to coastal processes.	within the natural variation of the sediment regime present in the area. Saltmarsh plants are adapted to accreting environments (Tyler-Walters, 2004). Due to the negligible levels of sediment predicted to be deposited, and the fact that any material will beredistributed through normal tidal conditions, it is concluded that sediment deposition from the Proposed Development alone will not adversely affect the integrity of the site. Considering the indiscernible effects predicted to result from the Proposed Development alone, and the fact that all other activities which may result from in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination deposition of sediment (smothering). No discernible effects on normal sediment and water movement, or sediment composition are predicted, and no effects on habitat connectivity or their ability to transition are predicted.
		Deposition of Sediment (Smothering)	Structure and function (including its typical species): key structural, influential and distinctive species	Maintain the abundance of the species listed to enable each of them to be a viable component of the Annex I habitat feature	
		Deposition of Sediment (Smothering)	Structure and function: sediment size and availability	Maintain the availability and size range of those sediments typical of the feature at the site.	
		Deposition of Sediment (Smothering)	Supporting Processes: functional connectivity with wider coastal sedimentary system	Maintain adequate inputs of sediment in the water column from the sediment sources (offshore / eroding cliffs, etc).	
		Pollution	Supporting Processes: water quality	Where the feature is dependent on estuarine water, ensure water quality and quantity is restored to a standard that provides the necessary conditions to support the feature.	Unplanned oil or chemical spillages from vessels may occur during all development phases. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will ensure that these events will not result in adverse effects on site integrity as a result from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Intertidal Course Sediment	Maintaining or restoring:	Invasive species	Structure: non-native species and pathogens	Restrict the introduction and spread of non-native	Application of best practice plans and procedures (see section 10.2.5) will be followed by all contractors and vessels. This will reduce the potential for introduction of INIS introduction as far as is reasonably practicable and will ensure

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
	The extent and distribution of qualifying natural habitats and habitats of the qualifying species The structure and function (including typical species) of qualifying natural habitats The structure and function of the habitats of the qualifying species The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely The populations of each of the qualifying species The distribution of qualifying species within the site			species and pathogens, and their impacts.	that there will be no adverse effects on the integrity of the site as a result of invasive species. Due to the lack of predicted effects, along with the application of any similar best practice measures employed for any other plan and project identified, it is concluded that no in combination adverse effects on the integrity of the site will arise on this feature as a result of invasive species.
		Pollution	Supporting Processes: sediment contaminants	Restrict surface sediment contaminants (<1cm from the surface) to below the OSPAR Environment Assessment Criteria (EAC) or Effects Range Low (ERL) threshold. For example, mean cadmium levels should be maintained below the ERL of 1.2 mg per kg.	Unplanned oil or chemical spillages from vessels may occur during all development phases. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will ensure that these events will not result in adverse effects on site integrity as a result from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
		Pollution	Supporting Processes: water quality - contaminants	Reduce aqueous contaminants to levels equating to High / Good Status according to Annex VIII and X of the WFD, avoiding deterioration from existing levels.	
		Deposition of sediment (Smothering)	Supporting Processes: sediment movement and hydrodynamic regime	Maintain sediment transport pathways to and from the feature to ensure replenishment of habitats that rely on the sediment supply.	The Natural England Advice on Operations package lists this sub-feature as not sensitive to increase in SSC or deposition of sediment at any stage of construction, operation or decommissioning. Therefore, it is concluded that there is no potential for adverse effects on the integrity of the site to arise as a result of the deposition of sediment on this sub-feature.
		Deposition of Sediment (Smothering)	Distribution: presence and spatial distribution	Maintain the presence and spatial distribution of estuary communities.	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
			of biological communities		
		Deposition of Sediment (Smothering)	Structure: species composition of component communities	Restore the Species composition of component communities.	
		Deposition of Sediment (Smothering)	Structure: substrate composition and distribution	Maintain the distribution, composition and character of substrate across the feature (and each of its subfeatures).	
		Increased SSC	Structure: sediment TOC content	Maintain the TOC content in the sediment at existing levels.	
		Increased SSC	Supporting Processes: water quality - DO	Maintain the DO concentration at levels equating to High Ecological Status (specifically ≥ 5.7 mg per litre (at 35 salinity) for 95 % of the year), avoiding deterioration from existing levels.	
		Increased SSC	Supporting Processes: water quality - nutrients	Restore water quality to mean winter dissolved inorganic nitrogen levels at which biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms) do not affect the integrity of the site and features.	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
		Increased SSC	Supporting Processes: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	
		Increased SSC	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of estuary communities.	
		Increased SSC	Structure: species composition of component communities	Restore the Species composition of component communities.	
Intertidal Mixed sediment	Maintaining or restoring: The extent and distribution of qualifying natural habitats and habitats of the qualifying species The structure and function (including typical species) of qualifying natural habitats The structure and function of the habitats of the	Invasive species	Structure: non-native species and pathogens	Reduce the introduction and spread of non-native species and pathogens, and their impacts.	Application of best practice plans and procedures (see section 10.2.5) will be followed by all contractors and vessels. This will prevent INIS introduction as far as is reasonably practicable and will ensure that there will be no adverse effects on the integrity of the site as a result of invasive species from the Proposed Development alone. Due to the lack of predicted effects, along with the application of any similar best practice measures employed for any other plan and project identified, it is concluded that no in combination adverse effects on the integrity of the site will arise on this feature as a result of invasive species.
		Pollution	Supporting Processes: sediment contaminants	Restrict surface sediment contaminants (<1cm from the surface) to below the OSPAR Environment Assessment Criteria (EAC) or Effects Range Low (ERL) threshold. For example, mean cadmium levels should	Unplanned oil or chemical spillages from vessels may occur during all development phases. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurring and therefore will not result in adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
	qualifying species The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely The populations of each of the qualifying species The distribution of qualifying species within the site			be maintained below the ERL of 1.2 mg per kg.	in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
		Pollution	Supporting Processes: water quality - contaminants	Reduce aqueous contaminants to levels equating to High / Good Status according to Annex VIII and X of the WFD, avoiding deterioration from existing levels.	
		Deposition of Sediment (Smothering)	Supporting Processes: sediment movement and hydrodynamic regime	Maintain sediment transport pathways to and from the feature to ensure the replenishment of habitats that are reliant on the sediment supply.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km); which equates to disposal seaward of KP21 of the Marine Cable Corridor. Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there will be no sediment deposition with the SAC resulting from dredge disposal activities. Deposition from other cable installation activities (including excavation of HDD pits between KP1 and KP1.6) is not predicted to be significant, with any coarse material mobilised deposited rapidly (i.e. within several hundred metres of the cable trench). Finer sediment will be dispersed across a greater spatial extent, transiently depositing throughout the tidal cycle. However, due to the low volumes of sediment likely to be liberated into the water column and significant dispersion of fine sediment, it is considered that deposition will be negligible with sediments quickly resuspended and redistributed under the forcing of tidal flows. The mouth of Langstone harbour (the closest Estuary feature within the SAC, within which mudflat features exist) is approximately 1 km from the proposed HDD entry/exit pits (at their closest possible location), and therefore it is concluded that it will be outwith the area where the majority of sediment is deposited. The highly limited magnitude and temporary nature of the deposition of sediments predicted, along with the ability of most species present in such habitats to survive or recover quickly (days-weeks) from light smothering events (Tillin and Ashley, 2018) ensures that any deposition of sediment resulting from the Proposed Development alone will not adversely affect the integrity of the sub-feature. No
		Deposition of Sediment (Smothering)	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of estuary communities.	
		Deposition of Sediment (Smothering)	Structure: species composition of component communities	Restore the Species composition of component communities.	
		Deposition of Sediment (Smothering)	Structure: substrate composition and distribution	Maintain the distribution, composition and character of substrate across the feature (and each of its subfeatures).	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
					discernible effects on normal sediment and water movement, or sediment composition are predicted. Considering the indiscernible effects predicted to result from the Proposed Development alone, the general lack of sensitivity, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination deposition of sediment (smothering) resulting from the Proposed Development and other project and plans.
		Increased SSC	Structure: sediment TOC content	Maintain TOC content in the sediment at existing levels.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there will be no connectivity between increased SSC / sediment plumes and the SAC resulting from the disposal of dredge material. For activities other than the deposition of dredged material, the worst-case activities which will lead to increased SSC are considered to be excavation at the HDD pit(s) (between KP1 and KP1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations). It is predicted that peak SSCs of up to 200 mgl^{-1} may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl^{-1} are predicted. SSC is expected to return to background levels within a few days following completion of these activities. The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl^{-1}) and therefore not discernible above natural variation. Natural variation ranges from approximately <5 to 75 mgl^{-1} in coastal areas, with annual averages of between 5 – 15 mgl^{-1} observed within surface waters. The mouth of Langstone harbour (the closest Estuary feature within the SAC) is approximately 1 km from the proposed HDD entry/exit pits (at their closest possible location). SSC variability within the harbour is high, owing to its tidal nature and frequent exposure to storm induced fluctuations (New Forest District Council, 2017). Suspended sediments within Langstone harbour have been measured at 200 mgl^{-1}, while measured SSC in nearby harbours have been recorded up to 100
		Increased SSC	Supporting Processes: water quality - DO	Maintain DO concentration at levels equating to High Ecological Status (specifically ≥ 5.7 mg L-1 (at 35 salinity) for 95 % of the year), avoiding deterioration from existing levels.	
		Increased SSC	Supporting Processes: water quality - nutrients	Restore water quality to mean winter dissolved inorganic nitrogen levels at which biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms) do not affect the integrity of the site and features.	
		Increased SSC	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of estuary communities.	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
		Increased SSC	Structure: species composition of component communities	Restore the Species composition of component communities.	mgl^{-1} (Portsmouth) (Humby and Dunn, 1975 – cited in New Forest District Council, 2017). According to in the Advice on Operations for this SAC, this sub feature is not considered sensitive to nutrients or organic content. Furthermore, the species present in these littoral mixed sediments are typically highly tolerant of increased sediment loading, being in the main burrowing species with a preference for sediments with a high degree of fine sediments which are mobilised readily on immersion by tides (Tillin and Ashley, 2018). Therefore, the predicted levels of increased SSC, which will only persist for a short duration before returning to normal levels are not considered to lead to adverse effects on site integrity. No effect on the natural levels of turbidity, DO, or nutrients are predicted following cessation of the activity, and no effects on TOC levels are predicted. Considering the indiscernible effects predicted by the Proposed Development, the general lack of sensitivity to the effect, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination increases in SSC.
		Increased SSC	Supporting Processes: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	
Intertidal Mud	Maintaining or restoring: The extent and distribution of qualifying natural habitats and habitats of the qualifying species The structure and function (including typical species) of qualifying natural habitats The structure and	Invasive species	Structure: non-native species and pathogens	Reduce the introduction and spread of non-native species and pathogens, and their impacts.	Application of best practice plans and procedures (see section 10.2.5) will be followed by all contractors and vessels. This will prevent the introduction of INIS introduction as far as is reasonably practicable and will ensure that there will be no adverse effects on the integrity of the site as a result of invasive species. Due to the lack of predicted effects, along with the application of any similar best practice measures employed for any other plan and project identified, it is concluded that no in combination adverse effects will arise on this feature as a result of invasive species.
		Increased SSC	Structure: sediment TOC content	Maintain TOC content in the sediment at existing levels.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there will be no connectivity between increased SSC / sediment plumes and the SAC resulting from the disposal of dredge material. For activities other than the deposition of dredged material, the worst-case activities which will lead to increased SSC are considered to be excavation at the HDD pit(s) (between KP1 and KP1.6), and cable installation (due to the potential

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
	function of the habitats of the qualifying species The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely The populations of each of the qualifying species The distribution of qualifying species within the site				for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations). It is predicted that peak SSCs of up to 200 mgl^{-1} may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl^{-1} are predicted. SSC will return to background levels within a few days following completion of these activities. The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl^{-1}) and therefore not discernible above natural variation. Natural variation ranges from approximately <5 to 75 mgl^{-1} in coastal areas, with annual averages of between 5 – 15 mgl^{-1} observed within surface waters. The mouth of Langstone harbour (which contains the closest intertidal mud feature within the SAC) is approximately 1 km from the proposed HDD entry/exit pits (at their closest possible location). SSC variability within the harbour is high, owing to its tidal nature and frequent exposure to storm induced fluctuations (New Forest District Council, 2017). Suspended sediments within Langstone harbour have been measured at 200 mgl^{-1}, while measured SSC in nearby harbours have been recorded up to 100 mgl^{-1} (Portsmouth) (Humby and Dunn, 1975 – cited in New Forest District Council, 2017). The qualifying features present within the SAC, are highly tolerant of the predicted levels of increased SSC, which will only persist for a short duration. Therefore, it is concluded that there will be no adverse effects on site integrity from increased SSC from the Proposed Development alone on intertidal mud features. Indiscernible effects on the natural levels of turbidity, DO, TOC, or nutrients are predicted following cessation of the activity. Considering the indiscernible effects resulting from the Proposed Development alone, the general lack of sensitivity to the impact, and the fact that all other activities which may result from in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination increases in SSC.

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
		Pollution	Supporting Processes: sediment contaminants	Restrict surface sediment contaminants (<1cm from the surface) to below the OSPAR Environment Assessment Criteria (EAC) or Effects Range Low (ERL) threshold. For example, mean cadmium levels should be maintained below the ERL of 1.2 mg per kg.	Unplanned oil or chemical spillages from vessels may occur during all development phases. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will ensure that these events do notresult in adverse effects on site integrity as a result from the Proposed Development. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
		Pollution	Supporting Processes: water quality - contaminants	Reduce aqueous contaminants to levels equating to High / Good Status according to Annex VIII and X of the WFD, avoiding deterioration from existing levels.	
		Deposition of sediment (Smothering)	Supporting Processes: sediment movement and hydrodynamic regime	Maintain sediment transport pathways to and from the feature to ensure replenishment of habitats that rely on the sediment supply.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km); which equates to disposal seaward of KP21 of the Marine Cable Corridor. Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there will be no sediment deposition with the SAC resulting from dredge disposal activities. Deposition from other cable installation activities (including excavation of HDD pits between KP1 and KP1.6) is not predicted to be significant, with any coarse material mobilised deposited rapidly (i.e. within several hundred metres of the cable trench). Finer sediment will be dispersed across a greater spatial extent, transiently depositing throughout the tidal cycle. However, due to the low volumes of sediment likely to be liberated into the water column and significant dispersion of fine sediment, it is considered that deposition will be negligible with sediments quickly resuspended and redistributed under the forcing of tidal flows.
		Deposition of Sediment (Smothering)	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of estuary communities.	
		Deposition of Sediment (Smothering)	Structure: species composition of component communities	Restore the Species composition of component communities.	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
		Deposition of Sediment (Smothering)	Structure: substrate composition and distribution	Maintain the distribution, composition and character of substrate across the feature (and each of its subfeatures).	The mouth of Langstone harbour (the closest Estuary feature within the SAC, within which mudflat features exist) is approximately 1 km from the proposed HDD entry/exit pits (at their closest possible location), and therefore it is considered that it will be outwith the area where the majority of sediment is deposited. The highly limited magnitude and temporary nature of the deposition of sediments predicted, along with the ability of most species present in such habitats to survive or recover quickly (days-weeks) light smothering events (Ashley, 2016) ensures that any deposition of sediment resulting from the Proposed Development alone will not adversely affect the integrity of the sub-feature. No material effects on normal sediment and water movement, or sediment composition are predicted. Considering the indiscernibleeffects predicted to result from the Proposed Development alone, the general lack of sensitivity, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effect on site integrity from in combination deposition of sediment (smothering), with other project and plans.
		Increased SSC	Supporting Processes: water quality - DO	Maintain the DO concentration at levels equating to High Ecological Status (specifically ≥ 5.7 mg per litre (at 35 salinity) for 95 % of the year), avoiding deterioration from existing levels.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there will be no connectivity between increased SSC / sediment plumes and the SAC resulting from the disposal of dredge material. For activities other than the deposition of dredged material, the worst-case activities which will lead to increased SSC are considered to be excavation at the HDD pit(s) (between KP1 and KP1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations). It is predicted that peak SSCs of up to 200 mgl^{-1} may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl^{-1} are predicted. SSC is expected to return to background levels within a few days following completion of these activities. The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl^{-1}) and therefore not discernible above natural variation.
		Increased SSC	Supporting Processes: water quality - nutrients	Restore water quality to mean winter dissolved inorganic nitrogen levels at which biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms)	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
				do not affect the integrity of the site and features.	Natural variation ranges from approximately <5 to 75 mgl^{-1} in coastal areas, with annual averages of between 5 – 15 mgl^{-1} observed within surface waters. The mouth of Langstone harbour (the closest Estuary feature within the SAC) is approximately 1 km from the proposed HDD entry/exit pits (at their closest possible location). SSC variability within the harbour is high, owing to its tidal nature and frequent exposure to storm induced fluctuations (New Forest District Council, 2017). Suspended sediments within Langstone harbour have been measured at 200 mgl^{-1}, while measured SSC in nearby harbours have been recorded up to 100 mgl^{-1} (Portsmouth) (Humby and Dunn, 1975 – cited in New Forest District Council, 2017). According to in the Advice on Operations for this SAC this sub feature is not considered sensitive to nutrients or organic content. Furthermore, the species present in these littoral mixed sediments are typically highly tolerant of increased sediment loading, being in the main burrowing species with a preference for sediments with a high degree of fine sediments which are mobilised readily on immersion by tides (Ashley, 2016). Therefore, the predicted levels of increased SSC, which will only persist for a short duration before returning to normal levels are not considered to lead to adverse effects on site integrity. No effect on the natural levels of turbidity, DO, or nutrients are predicted following cessation of the activity. Considering the indiscernibleimpacts predicted to result from the Proposed Development, the general lack of sensitivity to the effect, and the fact that all other activities which may result in in combination effects are predicted to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination increases in SSC.
		Increased SSC	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of estuary communities.	
		Increased SSC	Structure: species composition of component communities	Restore the Species composition of component communities.	
		Increased SSC	Supporting Processes: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	
Intertidal sand and muddy sand	Maintaining or restoring: The extent and distribution of qualifying natural habitats and habitats of the qualifying	Invasive species	Structure: non-native species and pathogens	Reduce the introduction and spread of non-native species and pathogens, and their impacts.	Application of best practice plans and procedures (see section 10.2.5) will be followed by all contractors and vessels. This will prevent the introduction of INIS as far as is reasonably practicable and will ensure that there will be no adverse effects on the integrity of the site as a result of invasive species. Due to the lack of predicted effects, along with the application of any similar best practice measures employed for any other plan and project identified, it is concluded that in combination impacts will not result in an adverse effect on site integrity.

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
	species The structure and function (including typical species) of qualifying natural habitats The structure and function of the habitats of the qualifying species The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely The populations of each of the qualifying species The distribution of qualifying species within the site	Pollution	Supporting Processes: sediment contaminants	Restrict surface sediment contaminants (<1cm from the surface) to below the OSPAR Environment Assessment Criteria (EAC) or Effects Range Low (ERL) threshold. For example, mean cadmium levels should be maintained below the ERL of 1.2 mg per kg.	Unplanned oil or chemical spillages from vessels may occur during all development phases. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on site integrity as a result of the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
		Pollution	Supporting Processes: water quality - contaminants	Reduce aqueous contaminants to levels equating to High / Good Status according to Annex VIII and X of the WFD, avoiding deterioration from existing levels.	
		Deposition of sediment	Supporting Processes: sediment movement and hydrodynamic regime	Maintain sediment transport pathways to and from the feature to ensure the replenishment of habitats that rely on the sediment supply.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km); which equates to disposal seaward of KP21 of the Marine Cable Corridor. Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there will be no sediment deposition with the SAC resulting from dredge disposal activities. Deposition from other cable installation activities (including excavation of HDD pits between KP1 and KP1.6) is not predicted to be significant, with any coarse material mobilised deposited rapidly (i.e. within several hundred metres of the cable trench). Finer sediment will be dispersed across a greater spatial extent, transiently depositing throughout the tidal cycle. However, due to the low volumes of sediment likely to be liberated into the water column and significant dispersion of fine sediment, it is considered that deposition will be negligible with sediments quickly resuspended and redistributed under the forcing of tidal flows. The mouth of Langstone harbour (the closest Estuary feature within the SAC, within which mudflat features exist) is approximately 1 km from the proposed HDD
		Deposition of Sediment (Smothering)	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of estuary communities.	
		Deposition of Sediment (Smothering)	Structure: species composition of component communities	Restore the Species composition of component communities.	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
		Deposition of Sediment (Smothering)	Structure: substrate composition and distribution	Maintain the distribution, composition and character of substrate across the feature (and each of its subfeatures).	entry/exit pits (at their closest possible location), and therefore it is considered that it will be outwith the area where the majority of sediment is deposited. The highly limited magnitude and temporary nature of the deposition of sediments predicted, along with the ability of most species present in such habitats to survive or recover quickly from light smothering events (Tyler-Walters and Marshall, 2006) ensures that any deposition of sediment resulting from the Proposed Development alone will not adversely affect the integrity of the sub-feature. No effects on the normal sediment pathways are predicted, and no materialchanges to sediment structure or composition are predicted. Considering indiscernibleeffects predicted to result from the Proposed Development, the general lack of sensitivity, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination deposition of sediment (smothering).
		Increased SSC	Supporting Processes: water quality - DO	Maintain the DO concentration at levels equating to High Ecological Status (specifically ≥ 5.7 mg L-1 (at 35 salinity) for 95 % of the year), avoiding deterioration from existing levels.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there will be no connectivity between increased SSC / sediment plumes and the SAC resulting from the disposal of dredge material. For activities other than the deposition of dredged material, the worst-case activities which will lead to increased SSC are considered to be excavation at the HDD pit(s) (between KP1 and KP1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations). It is predicted that peak SSCs of up to 200 mgl^{-1} may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl^{-1} are predicted. SSC is expected to return to background levels within a few days following completion of these activities.
		Increased SSC	Supporting Processes: water quality - nutrients	Restore water quality to mean winter dissolved inorganic nitrogen levels at which biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms) do not affect the integrity of the site and features.	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
		Increased SSC	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of estuary communities.	The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl^{-1}) and therefore not discernible above natural variation. Natural variation ranges from approximately <5 to 75 mgl^{-1} in coastal areas, with annual averages of between 5 – 15 mgl^{-1} observed within surface waters. The mouth of Langstone harbour (the closest Estuary feature within the SAC) is approximately 1 km from the proposed HDD entry/exit pits (at their closest possible location). SSC variability within the harbour is high, owing to its tidal nature and frequent exposure to storm induced fluctuations (New Forest District Council, 2017). Suspended sediments within Langstone harbour have been measured at 200 mgl^{-1}, while measured SSC in nearby harbours have been recorded up to 100 mgl^{-1} (Portsmouth) (Humby and Dunn, 1975 – cited in New Forest District Council, 2017). According to in the Advice on Operations for this SAC ,this sub feature is not considered sensitive to nutrients. Furthermore, the species present in these littoral mixed sediments are typically highly tolerant of increased sediment loading, being in the main burrowing species with a preference for sediments with a high degree of fine sediments which are mobilised readily on immersion by tides (Tyler-walters and Marshall, 2006). Therefore, the predicted levels of increased SSC resulting from the Proposed Development alone, which will only persist for a short duration before returning to normal levels are not considered to lead to adverse effects on site integrity. No effect on the natural level of turbidity is predicted following cessation of the activity, and discernible changes to the organic content of the sediments or inorganic nitrogen levels are predicted. Considering the indiscernibleeffects predicted as a result of the Proposed Development alone, the general lack of sensitivity to the effect, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there is no potential for adverse effects on site integrity from in combination increases in SSC.
		Increased SSC	Structure: species composition of component communities	Restore the Species composition of component communities.	
		Increased SSC	Supporting Processes: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	
		Increased SSC	Structure: sediment TOC content	Maintain TOC content in the sediment at existing levels.	
Intertidal seagrass beds	Maintaining or restoring: The extent and	Invasive species	Structure: non-native species and pathogens	Reduce the introduction and spread of non-native species and pathogens, and their impacts.	Application of best practice plans and procedures (see section 10.2.5) will be followed by all contractors and vessels. This will prevent INIS introduction as far as is reasonably practicable and will ensure that there will be no adverse effect on the integrity of the site as a result of invasive species.

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
	distribution of qualifying natural habitats and habitats of the qualifying species The structure and function (including typical species) of qualifying natural habitats The structure and function of the habitats of the qualifying species The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely The populations of each of the qualifying species The distribution of qualifying species within the site				Due to the lack of predicted effects, along with the application of any similar best practice measures employed for any other plan and project identified, it is considered that no in combination adverse effects on the integrity of the site will arise on this feature as a result of invasive species.
		Pollution	Supporting Processes: sediment contaminants	Restrict surface sediment contaminants (<1cm from the surface) to below the OSPAR Environment Assessment Criteria (EAC) or Effects Range Low (ERL) threshold. For example, mean cadmium levels should be maintained below the ERL of 1.2 mg per kg.	Unplanned oil or chemical spillages from vessels may occur during all development phases. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will ensure that these events will not result in adverse effects on site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
		Pollution	Supporting Processes: water quality - contaminants	Reduce aqueous contaminants to levels equating to High / Good Status according to Annex VIII and X of the WFD, avoiding deterioration from existing levels.	
		Deposition of sediment	Supporting Processes: sedimentation rate	Maintain the natural rate of sediment deposition.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km); which equates to disposal seaward of KP21 of the Marine Cable Corridor. Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there will be no sediment deposition with the SAC resulting from dredge disposal activities. Deposition from other cable installation activities (including excavation of HDD pits between KP1 and KP1.6) is not predicted to be significant, with any coarse material mobilised deposited rapidly (i.e. within several hundred metres of the cable trench). Finer sediment will be dispersed across a greater spatial extent,
		Deposition of Sediment (Smothering)	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of estuary communities.	
		Deposition of Sediment (Smothering)	Structure: species composition of component communities	Restore the Species composition of component communities.	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
		Deposition of Sediment (Smothering)	Structure: substrate composition and distribution	Maintain the distribution, composition and character of substrate across the feature (and each of its subfeatures).	transiently depositing throughout the tidal cycle. However, due to the low volumes of sediment likely to be liberated into the water column and significant dispersion of fine sediment, it is considered that deposition will be indiscernible with sediments quickly resuspended and redistributed under the forcing of tidal flows. The mouth of Langstone harbour (the closest Estuary feature within the SAC containing this sub-feature) is approximately 1 km from the proposed HDD entry/exit pits (at their closest possible location), and therefore it is considered that it will be outwith the area where the majority of sediment is deposited. Therefore, any deposition of sediment resulting from the Proposed Development alone will be 'light', temporary in nature and will not adversely affect the integrity of the sub-feature, which due to its presence within an area of natural sediment accretion will be tolerant of the very low levels of deposition predicted. Considering the very small and localised effects predicted to result from the Proposed Development alone, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination effects of deposition of sediment (smothering).
		Increased SSC	Supporting Processes: water quality - DO	Maintain the DO concentration at levels equating to High Ecological Status (specifically ≥ 5.7 mg per litre (at 35 salinity) for 95 % of the year), avoiding deterioration from existing levels.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there will be no connectivity between increased SSC / sediment plumes and the SAC resulting from the disposal of dredge material. For activities other than the deposition of dredged material, the worst-case activities which will lead to increased SSC are considered to be excavation at the HDD pit(s) (between KP1 and KP1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations). It is predicted that peak SSCs of up to 200 mgl^{-1} may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl^{-1} are predicted. SSC is expected to return to background levels within a few days following completion of these activities.
		Increased SSC	Supporting Processes: water quality - nutrients	Restore water quality to mean winter dissolved inorganic nitrogen levels at which biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms)	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
				do not affect the integrity of the site and features.	The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl^{-1}) and therefore not discernible above natural variation. Natural variation ranges from approximately <5 to 75 mgl^{-1} in coastal areas, with annual averages of between 5 – 15 mgl^{-1} observed within surface waters. The mouth of Langstone harbour (the closest Estuary feature within the SAC within which this sub-feature is present) is approximately 1 km from the proposed HDD entry/exit pits (at their closest possible location). SSC variability within the harbour is high, owing to its tidal nature and frequent exposure to storm induced fluctuations (New Forest District Council, 2017). Suspended sediments within Langstone harbour have been measured at 200 mgl^{-1}, while measured SSC in nearby harbours have been recorded up to 100 mgl^{-1} (Portsmouth) (Humby and Dunn, 1975 – cited in New Forest District Council, 2017). Seagrass beds, although not tolerant to very high or long term increases in SSC (due to a reduction in photosynthesis and reduced oxygen levels), are tolerant to such short term isolated events as would be experienced as a result of the Proposed Development (D'Avack, et al., 2019a). Seagrass beds are also located over a kilometre from the mouth of the harbour and as such will not be affected by very high levels of SSC with received levels likely well within normal background levels, and lower than peak levels experienced in this environment. Littoral beds are also able to photosynthesise during periods of exposure. No changes to littoral seagrass bed function or distribution are therefore considered likely to arise as a result of the Proposed Development. In addition, according to in the Advice on Operations for this SAC ,this sub feature is not considered sensitive to deoxygenation. Therefore, the predicted levels of increased SSC resulting from the Proposed Development alone, which will only persist for a short duration before returning to normal levels are not considered to lead to adverse effects on site integrity. No discernible effect on the natural level of turbidity is predicted following cessation of the activity, and no effects in inorganic nitrogen levels are predicted. Considering the indiscernible effects predicted as a result of the Proposed Development alone, the general lack of sensitivity to the effect, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination increases in SSC.
		Increased SSC	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of estuary communities.	
		Increased SSC	Structure: species composition of component communities	Restore the Species composition of component communities.	
		Increased SSC	Supporting Processes: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
Salicornia and other annuals colonising mud and sand	Maintaining or restoring: The extent and distribution of qualifying natural habitats and habitats of the qualifying species The structure and function (including typical species) of qualifying natural habitats The structure and function of the habitats of the qualifying species The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely The populations of each of the qualifying species The distribution of	Invasive Species	Structure and function: vegetation - undesirable species	The frequency / cover of the following undesirable species are maintained at acceptable levels and are not encouraged by changes in surface condition, soils, nutrient levels or changes to hydrology: Spartina anglica.	Application of best practice plans and procedures (see section 10.2.5) will be followed by all contractors and vessels. This will prevent INIS introduction as far as is reasonably practicable and will ensure that there will be no adverse effects on the integrity of the site as a result of invasive species from the Proposed Development alone. Due to the lack of predicted effects, along with the application of any similar best practice measures employed for any other plan and project identified, it is concluded that no in combination adverse effects on the integrity of the site will arise on this feature as a result of invasive species.
		Increased SSC	Supporting Processes: water quality	Where the feature is dependent on estuarine water, ensure water quality and quantity is restored to a standard that provides the necessary conditions to support the feature.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2) indicate that, at this distance, there will be no connectivity between increased SSC and the SAC. For activities other than the deposition of dredged material, the worst-case activities which will lead to increased SSC are considered to be excavation at the HDD pits, and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations). It is predicted that peak SSCs of up to 200 mgl-1 may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl-1 are predicted. SSC is expected to return to background levels within a few days following completion of these activities. The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl-1) and therefore not discernible above natural variation. Natural variation ranges from approximately <5 to 75 mgl-1 in coastal areas, with annual averages of between 5 – 15 mgl-1 observed within surface waters. The mouth of Langstone harbour (the closest Estuary feature within the SAC) is approximately 1 km from the proposed HDD entry/exit pits (at their closest possible
		Increased SSC	Distribution of the feature, including associated transitional habitats, within the site	Maintain the range of the habitat and natural transitions within saltmarsh types and to other habitats seaward and landward.	
		Increased SSC	Extent of the feature within the site	Restore the total extent of saltmarsh features to at least 1,095 hectares.	
		Increased SSC	Future extent of habitat within the site and ability to respond to seasonal changes	Maintain the ability for colonisation each year of the annual species that comprise the habitat.	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
	qualifying species within the site	Increased SSC	Structure and function (including its typical species): key structural, influential and distinctive species	Maintain the abundance of the species listed to enable each of them to be a viable component of the Annex I habitat feature: *Aster tripolium*, *Puccinellia maritima*, Salicornia species, *Sueada maritima* and *Atriplex portulacoides*. SM27 also includes Sagina	location). SSC variability within the harbour is high, owing to its tidal nature and frequent exposure to storm induced fluctuations (New Forest District Council, 2017). Suspended sediments within Langstone harbour have been measured at 200 mgl-1, while measured SSC in nearby harbours have been recorded up to 100 mgl-1 (Portsmouth) (Humby and Dunn, 1975 – cited in New Forest District Council, 2017). Areas of estuarine habitat that could support this feature are located over 2 km from the closest marine activity (excavation of HDD pits), and as such will not be affected by high levels of SSC with received levels beingwithin normal background levels. Saltmarsh plants are tolerant of a degree of increased SSC, and the resulting turbidity. It is recognised that turbidity reduces the light attenuation through water, however salt marsh vegetation is immersed for the majority of the tidal cycle and able to photosynthesize. Therefore, slight increases in SSC as predicted to arise from the Proposed Development will not affect the growth or distribution of Salicornia and other annuals colonising mud and sand within the Solent Maritime SAC. No effects on normal sediment and water movement, or sediment composition are predicted, and no effects on habitat connectivity or their ability to transition are predicted. Therefore, it is concluded that there will be no adverse effects on site integrity from increased SSC on this feature. Considering the indiscernibleeffects predicted as a result of the Proposed Development, the general lack of sensitivity to the impact, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination increases in SSC.
		Increased SSC	Structure and function: sediment size and availability	Maintain the availability and size range of those sediments typical of the feature at the site.	
		Increased SSC	Supporting Processes: functional connectivity with wider coastal sedimentary system	Maintain adequate inputs of sediment in the water column from the sediment sources (offshore / eroding cliffs, etc).	
		Deposition of sediment	Supporting Processes: sedimentary Processes	Maintain the sedimentary processes (suspended sediment, sediment transfer, etc) that sustain the elevation and topography of the marsh surface.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2) indicate that, at this distance, there will be no connectivity for sediment deposition with the SAC. Deposition from other cable installation activities (including excavation of HDD pits) is not predicted to be significant with any coarse material mobilised deposited rapidly (i.e. within several hundred metres of the cable trench). Finer sediment will be dispersed across a greater spatial extent, transiently depositing throughout the tidal cycle. However, due to the volumes of sediment likely to be liberated into the water column and significant dispersion of fine sediment, deposition will be
		Deposition of sediment	Supporting Processes: tidal Processes	Maintain the degree of tidal immersion and emersion and tidal flows	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
				that supports the function of the habitat type.	negligible with sediments quickly resuspended and redistributed under the forcing of tidal flows. The mouth of Langstone harbour (the closest Estuary feature within the SAC) is approximately 1 km from the proposed HDD entry/exit pits (at their closest possible location), and the closest area of estuarine habitat that could support this feature is over 2 km from the HDD pits. Therefore, it will be outwith the area where the majority of sediment is deposited.Therefore, any deposition of sediment will be light, and likely within the natural variation of the sediment regime present in the area. Saltmarsh plants, particularly pioneer species, are adapted to accreting environments and may not be adversely affected by smothering events for up to a month (Tyler-Walters, 2001). Therefore, due to the negligible levels of sediment predicted to be deposited, and the fact that any material will be redistributed through normal tidal conditions, it is concluded that sediment deposition as a result of the Proposed Development will not adversely affect the integrity of the feature. Considering the indiscernibleeffects predicted as a result of the Proposed Development, and the fact that all other activities which may result in in combination effects are predicted to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination effects of deposition of sediment (smothering).
		Deposition of Sediment (Smothering)	Distribution of the feature, including associated transitional habitats, within the site	Maintain the range of the habitat and natural transitions within saltmarsh types and to other habitats seaward and landward.	
		Deposition of Sediment (Smothering)	Extent of the feature within the site	Restore the total extent of saltmarsh features to at least 1,095 hectares.	
		Deposition of Sediment (Smothering)	Future extent of habitat within the site and ability to respond to seasonal changes	Maintain the ability for colonisation each year of the annual species that comprise the habitat.	
		Deposition of Sediment (Smothering)	Structure and function (including its typical species): key structural, influential and distinctive species	Maintain the abundance of the species listed to enable each of them to be a viable component of the Annex I habitat feature: Aster tripolium, Puccinellia maritima, Salicornia species, Sueada maritima and Atriplex portulacoides. SM27 also includes Sagina	
		Deposition of Sediment (Smothering)	Structure and function: sediment size and availability	Maintain the availability and size range of those sediments typical of the feature at the site.	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
		Deposition of Sediment (Smothering)	Supporting Processes: functional connectivity with wider coastal sedimentary system	Maintain adequate inputs of sediment in the water column from the sediment sources (offshore / eroding cliffs, etc).	
		Pollution	Supporting Processes: water quality	Where the feature is dependent on estuarine water, ensure water quality and quantity is restored to a standard that provides the necessary conditions to support the feature.	Unplanned oil or chemical spillages from vessels may occur during all development phases. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on site integrity as a result of the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity from in combination effects with other plans and projects.
Spartina swards (*Spartinion maritimae*)	Maintaining or restoring: The extent and distribution of qualifying natural habitats and habitats of the qualifying species The structure and function (including typical species) of qualifying natural habitats The structure and function of the	Invasive Species	Structure and function: vegetation - undesirable species	The frequency / cover of the following undesirable species are maintained at acceptable levels and are not encouraged by changes in surface condition, soils, nutrient levels or changes to hydrology: Spartina anglica.	Application of best practice plans and procedures (see section 10.2.5) will be followed by all contractors and vessels. This will prevent INIS introduction as far as is reasonably practicable and will ensure that there will be no adverse effect on the integrity of the site as a result of invasive species. Due to the lack of predicted effects, along with the application of any similar best practice measures employed for any other plan and project identified, it is concluded that no in combination adverse effects on the integrity of the site will arise on this feature as a result of invasive species.
		Increased SSC	Supporting Processes: water quality	Where the feature is dependent on estuarine water, ensure water quality and quantity is restored to a standard that provides the necessary conditions to support the feature.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2) indicate that, at this distance, there will be no connectivity for increased SSC /sediment plumes within the SAC. For activities other than the deposition of dredged material, the worst-case activities which will lead to increased SSC are considered to be excavation at the

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
	habitats of the qualifying species The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely The populations of each of the qualifying species The distribution of qualifying species within the site	Increased SSC	Distribution of the feature, including associated transitional habitats, within the site	Restore the range of the habitat including natural transitions with other saltmarsh types.	HDD pits, and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations). It is predicted that peak SSCs of up to 200 mgl-1 may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl-1 are predicted. SSC is expected to return to background levels within a few days following completion of these activities. The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl-1) and therefore not discernible above natural variation. Natural variation ranges from approximately <5 to 75 mgl-1 in coastal areas, with annual averages of between 5 – 15 mgl-1 observed within surface waters. The mouth of Langstone harbour (the closest Estuary feature within the SAC) is approximately 1 km from the proposed HDD entry/exit pits (at their closest possible location). SSC variability within the harbour is high, owing to its tidal nature and frequent exposure to storm induced fluctuations (New Forest District Council, 2017). Suspended sediments within Langstone harbour have been measured at 200 mgl-1, while measured SSC in nearby harbours have been recorded up to 100 mgl-1 (Portsmouth) (Humby and Dunn, 1975 – cited in New Forest District Council, 2017). Areas of estuarine habitat that could support this feature are located over 2 km from the closest marine activity (excavation of HDD pits), and as such will not be affected by high levels of SSC with received levels likely within normal background levels. Saltmarsh plants are tolerant of a degree of increased SSC, and the resulting turbidity. It is recognised that turbidity reduces the light attenuation through water, however salt marsh vegetation is immersed for the majority of the tidal cycle and able to photosynthesize. Therefore, slight increases in SSC as predicted to arise from the Proposed Development alone will not adversely affect the growth or distribution of Spartina swards within the Solent Maritime SAC. No effect on the natural levels of turbidity are predicted following cessation of the activity, and no effects on water quality or availability, sediment composition, or the ability of this feature to transition or fluctuate in extent are predicted. Therefore, it is concluded
		Increased SSC	Extent of the feature within the site	Restore the total extent of saltmarsh features to at least 1,095 hectares.	
		Increased SSC	Future extent of habitat within the site and ability to respond to seasonal changes	Maintain the ability to achieve seasonal fluctuations in the extent of habitat and the suitability of surrounding areas for colonisation.	
		Increased SSC	Structure and function (including its typical species): key structural, influential and distinctive species	Maintain the abundance of the species listed to enable each of them to be a viable component of the Annex I habitat feature: *Spartina maritima*, *S. alterniflora*, *S. townsendii*, *Arthrocnemum perenne*, *Puccinellia maritima*, Salicornia species, *Sueada maritima*	
		Increased SSC	Structure and function: sediment size and availability	Maintain the availability and size range of those sediments typical of the feature at the site.	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
					that there will be no adverse effects on site integrity from increased SSC on this feature. Considering the indiscernibleeffects predicted as a result of the Proposed Development alone, the general lack of sensitivity to the impact, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination increases in SSC.
		Deposition of sediment	Supporting Processes: sedimentary Processes	Maintain the sedimentary processes (suspended sediment, sediment transfer, etc) that sustain the elevation and topography of the marsh surface.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2) indicate that, at this distance, there will be no connectivity for sediment deposition with the SAC. Therefore, any deposition of sediment will be light, and likely within the natural variation of the sediment regime present in the area. Saltmarsh plants are adapted to accreting environments and will not be adversely affected by smothering events for up to a month (Tyler-Walters, 2001). Deposition from other cable installation activities (including excavation of HDD pits) is not predicted to be significant with any coarse material mobilised deposited rapidly (i.e. within several hundred metres of the cable trench). Finer sediment will be dispersed across a greater spatial extent, transiently depositing throughout the tidal cycle. However, due to the volumes of sediment likely to be liberated into the water column and significant dispersion of fine sediment, it is considered that deposition will be indiscernible with sediments quickly resuspended and redistributed under the forcing of tidal flows. The mouth of Langstone harbour (the closest Estuary feature within the SAC) is approximately 1 km from the proposed HDD entry/exit pits (at their closest possible location), and the closest area of estuarine habitat that could support Spartina swards is over 2 km from the HDD pits. Therefore, it is concluded that it will be outwith the area where the majority of sediment is deposited and no adverse effects on the integrity of the site will arise from the Proposed Development alone from deposition of sediment on *Spartina* swards. Considering the very small and localised effects predicted as a result of the Proposed Development alone, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in
		Deposition of sediment	Supporting Processes: tidal Processes	Maintain the degree of tidal immersion and emersion that supports the function of the habitat type.	
		Deposition of Sediment (Smothering)	Distribution of the feature, including associated transitional habitats, within the site	Restore the range of the habitat including natural transitions with other saltmarsh types.	
		Deposition of Sediment (Smothering)	Structure and function: sediment size and availability	Maintain the availability and size range of those sediments typical of the feature at the site.	
		Deposition of Sediment (Smothering)	Extent of the feature within the site	Restore the total extent of saltmarsh features to at least 1,095 hectares.	
		Deposition of Sediment (Smothering)	Future extent of habitat within the site and ability to respond to seasonal changes	Maintain the ability to achieve seasonal fluctuations in the extent of habitat and the	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
				suitability of surrounding areas for colonisation.	combination deposition of sediment (smothering). No discernible effects on normal sediment and water movement, or sediment composition are predicted, and no effects on habitat connectivity, emersion regimes, or their ability to transition are predicted.
		Deposition of Sediment (Smothering)	Structure and function (including its typical species): key structural, influential and distinctive species	Maintain the abundance of the species listed to enable each of them to be a viable component of the Annex I habitat feature: Spartina maritima, S. alterniflora, S. townsendii, Arthrocnemum perenne, Puccinellia maritima, Salicornia species, Sueada maritima	
		Pollution	Supporting Processes: water quality	Where the feature is dependent on estuarine water, ensure water quality and quantity is restored to a standard that provides the necessary conditions to support the feature.	Unplanned oil or chemical spillages from vessels may occur during all development phases. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will ensure that these events fo not occur and therefore will not result in adverse effects on site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Subtidal course sediment	Maintaining or restoring: The extent and distribution of qualifying natural habitats and habitats of the qualifying species The structure and	Invasive species	Structure: non-native species and pathogens	Reduce the introduction and spread of non-native species and pathogens, and their impacts.	Application of best practice plans and procedures (see section 10.2.5) will be followed by all contractors and vessels. This will prevent INIS introduction as far as is reasonably practicable and will ensure that there will be no adverse effect on the integrity of the site as a result of invasive species. Due to the lack of predicted effects, along with the application of any similar best practice measures employed for any other plan and project identified, it is concluded that no in combination adverse effects on the integrity of the site will arise on this feature as a result of invasive species.
		Pollution	Supporting Processes: sediment contaminants	Restrict surface sediment contaminant levels to concentrations	Unplanned oil or chemical spillages from vessels may occur during all development phases. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
	function (including typical species) of qualifying natural habitats The structure and function of the habitats of the qualifying species The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely The populations of each of the qualifying species The distribution of qualifying species within the site			where they are not adversely impacting the infauna of the sub-feature.	10.2.5) and strict navigational protocols will ensure that these events do not occur and therefore will not result in adverse effects on Site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
		Pollution	Supporting Processes: water quality - contaminants	Reduce aqueous contaminants to levels equating to High / Good Status according to Annex VIII and X of the WFD, avoiding deterioration from existing levels.	
		Deposition of sediment	Supporting Processes: sediment movement and hydrodynamic regime	Maintain all hydrodynamic and physical conditions such that natural water flow and sediment movement are not significantly altered or prevented from responding to changes in environmental conditions.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there will be no connectivity for sediment deposition with the SAC. Deposition from other cable installation activities (including excavation of HDD pits) is not predicted to be significant with any coarse material mobilised deposited rapidly (i.e. within several hundred metres of the cable trench and within comparable habitat types). Finer sediment will be dispersed across a greater spatial extent, transiently depositing throughout the tidal cycle. However, due to the volumes of sediment likely to be liberated into the water column and significant dispersion of fine sediment, it is considered that deposition will be negligible with sediments quickly resuspended and redistributed under the forcing of tidal flows. Therefore, any deposition of sediment will be 'light' and temporary in nature. The feature is present in a high energy environment with a relatively high natural level of sediment movement, and as such is not sensitive to effects at the predicted level. Therefore, there will be no adverse effect on site integrity arising from deposition of sediment resulting from the Proposed Development alone on subtidal course sediment features. . Considering the indiscernible effects predicted as a result of the Proposed Development alone, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from effects from in combination deposition of sediment (smothering).
		Deposition of Sediment (Smothering)	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of estuary communities.	
		Deposition of Sediment (Smothering)	Structure: species composition of component communities	Restore the Species composition of component communities.	
		Deposition of Sediment (Smothering)	Structure: substrate composition and distribution	Maintain the distribution, composition and character of substrate	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
				across the feature (and each of its subfeatures).	
		Increased SSC	Supporting Processes: water quality - DO	Maintain the DO concentration at levels equating to High Ecological Status (specifically ≥ 5.7 mg L-1 (at 35 salinity) for 95 % of year), avoiding deterioration from existing levels.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2) indicate that, at this distance, there will be no connectivity from increased SSC with the SAC. For activities other than the deposition of dredged material, the worst-case activities which will lead to increased SSC are considered to be excavation at the HDD pits, and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations). It is predicted that peak SSCs of up to 200 mgl^{-1} may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl^{-1} are predicted. SSC is expected to return to background levels within a few days following completion of these activities. The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl-1) and therefore not discernible above natural variation. Natural variation ranges from approximately <5 to 75 mgl^{-1} in coastal areas, with annual averages of between 5 – 15 mgl^{-1} observed within surface waters. Coarse sediment habitats have a low sensitivity to increases in SSC as the species present are naturally found within high energy environments were sediment mobility is common (McQuillan and Tillin, 2006), as such no effects on species composition or distribution are predicted. Furthermore, the Natural England Advice on Operations package lists this sub-feature as not sensitive to nutrients at any stage of construction, operation or decommissioning. Changes DO are not expected to be outwith normal levels and any effects to this attribute would be temporary and short term, returning to background on cessation of the activity. No
		Increased SSC	Supporting Processes: water quality - nutrients	Restore water quality to mean winter dissolved inorganic nitrogen levels at which biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms) do not affect the integrity of the site and features.	
		Increased SSC	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of estuary communities.	
		Increased SSC	Structure: species composition of component communities	Restore the Species composition of component communities.	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
		Increased SSC	Supporting Processes: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	effects on inorganic nitrogen levels are predicted. Therefore, considering the discreet events predicted which will be similar to natural variation already experienced, it is concluded that there will be no adverse effects on site integrity from increased SSC on this sub feature. Considering the very small and localised effects predicted as a result of the Proposed Development, the lack of sensitivity to the impact, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination increases in SSC.
Subtidal mixed sediments	Maintaining or restoring: The extent and distribution of qualifying natural habitats and habitats of the qualifying species The structure and function (including typical species) of qualifying natural habitats The structure and function of the habitats of the qualifying species The supporting processes on which	Invasive species	Structure: non-native species and pathogens	Reduce the introduction and spread of non-native species and pathogens, and their impacts.	Application of best practice plans and procedures (see section 10.2.5) will be followed by all contractors and vessels. This will prevent INIS introduction as far as is reasonably practicable and will ensure that there will be no adverse effects on the integrity of the site as a result of invasive species. Due to the lack of predicted effects, along with the application of any similar best practice measures employed for any other plan and project identified, it is concluded that no in combination adverse effect on the integrity of the site will arise on this feature as a result of invasive species.
		Pollution	Supporting Processes: sediment contaminants	Restrict surface sediment contaminant levels to concentrations where they are not adversely impacting the infauna of the habitat.	Unplanned oil or chemical spillages from vessels may occur during all development phases. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will ensure that these events do not occurand therefore will not result in adverse effects on Site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
		Pollution	Supporting Processes: water quality - contaminants	Reduce aqueous contaminants to levels equating to High / Good Status according to Annex VIII and X of the WFD, avoiding deterioration from existing levels.	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
	qualifying natural habitats and the habitats of qualifying species rely The populations of each of the qualifying species The distribution of qualifying species within the site	Deposition of Sediment (Smothering)	Supporting Processes: sediment movement and hydrodynamic regime	Maintain all hydrodynamic and physical conditions such that natural water flow and sediment movement are not significantly altered or prevented from responding to changes in environmental conditions.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there will be no connectivity for sediment deposition with the SAC. Deposition from other cable installation activities (including excavation of HDD pits) is not predicted to be significant with any coarse material mobilised deposited rapidly (i.e. within several hundred metres of the cable trench and within comparable habitat types). Finer sediment will be dispersed across a greater spatial extent, transiently depositing throughout the tidal cycle. However, due to the volumes of sediment likely to be liberated into the water column and significant dispersion of fine sediment, it is considered that deposition will be indiscernible with sediments quickly resuspended and redistributed under the forcing of tidal flows. Therefore, any deposition of sediment will be 'light' and temporary in nature. The feature is present in environments with a relatively high natural level of sediment movement, and as such is not sensitive to effects at the predicted level. Therefore there will be no adverse effect on site integrity arising from the Proposed Development alone from deposition of sediment on subtidal course sediment features. Considering the indiscernible effects predicted as a result of the Proposed Development alone, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination effects of deposition of sediment (smothering).
		Deposition of Sediment (Smothering)	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of estuary communities.	
		Deposition of Sediment (Smothering)	Structure: species composition of component communities	Restore the Species composition of component communities.	
		Deposition of Sediment (Smothering)	Structure: substrate composition and distribution	Maintain the distribution, composition and character of substrate across the feature (and each of its subfeatures).	
		Increased SSC	Supporting Processes: water quality - DO	Maintain the DO concentration at levels equating to High Ecological Status (specifically ≥ 5.7 mg per litre (at 35 salinity) for 95 % of the year), avoiding deterioration from existing levels.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2) indicate that, at this distance, there will be no connectivity from increased SSC with the SAC. For activities other than the deposition of dredged material, the worst-case activities which will lead to increased SSC are considered to be excavation at the HDD pits, and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations).

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
		Increased SSC	Supporting Processes: water quality - nutrients	Restore water quality to mean winter dissolved inorganic nitrogen levels at which biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms) do not affect the integrity of the site and features.	It is predicted that peak SSCs of up to 200 mgl^{-1} may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl^{-1} are predicted. SSC is expected to return to background levels within a few days following completion of these activities. The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl-1) and therefore not discernible above natural variation. Natural variation ranges from approximately <5 to 75 mgl^{-1} in coastal areas, with annual averages of between 5 – 15 mgl^{-1} observed within surface waters. Mixed sediment habitats have a low sensitivity to increases in SSC as the species present are naturally found within high energy environments where sediment mobility is common (Readman, 2016), as such no significant effects on species composition or distribution are predicted. Furthermore, the Natural England Advice on Operations package lists this sub-feature as not sensitive to nutrients at any stage of construction, operation or decommissioning. Changes DO are not expected to be outwith normal levels and any effects to this attribute would be temporary and short term, returning to background on cessation of the activity. No effects on inorganic nitrogen levels are predicted. Therefore, considering the discreet events predicted which will be similar to natural variation already experienced, it is concluded that there will be no adverse effect on site integrity from increased SSC on this sub feature. Considering the indiscernibleeffects predicted as a result of the Proposed Development, the lack of sensitivity to the impact, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effect on site integrity from in combination effects from increases in SSC.
		Increased SSC	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of estuary communities.	
		Increased SSC	Structure: species composition of component communities	Restore the Species composition of component communities.	
		Increased SSC	Supporting Processes: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	
Subtidal sand	Maintaining or restoring: The extent and	Invasive species	Structure: non-native species and pathogens	Reduce the introduction and spread of non-native species and pathogens, and their impacts.	Application of best practice plans and procedures (see section 10.2.5) will be followed by all contractors and vessels. This will prevent INIS introduction as far as is reasonably practicable and will ensure that there will be no adverse effects on the integrity of the site as a result of invasive species.

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
	distribution of qualifying natural habitats and habitats of the qualifying species The structure and function (including typical species) of qualifying natural habitats The structure and function of the habitats of the qualifying species The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely The populations of each of the qualifying species The distribution of qualifying species within the site				Due to the lack of predicted effects, along with the application of any similar best practice measures employed for any other plan and project identified, it is concluded that no in combination adverse effects on the integrity of the site will arise on this feature as a result of invasive species.
		Pollution	Supporting Processes: sediment contaminants	Restrict surface sediment contaminant levels to concentrations where they are not adversely impacting the infauna of the sub-feature.	Unplanned oil or chemical spillages from vessels may occur during all development phases. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in an adverse effect on site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
		Pollution	Supporting Processes: water quality - contaminants	Reduce aqueous contaminants to levels equating to High / Good Status according to Annex VIII and X of the WFD, avoiding deterioration from existing levels.	
		Deposition of sediment	Supporting Processes: sediment movement and hydrodynamic regime	Maintain all hydrodynamic and physical conditions such that natural water flow and sediment movement are not significantly altered or prevented from responding to changes in environmental conditions.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there will be no connectivity for sediment deposition with the SAC. Deposition from other cable installation activities (including excavation of HDD pits) is not predicted to be significant with any coarse material mobilised deposited rapidly (i.e. within several hundred metres of the cable trench and within comparable habitat types). Finer sediment will be dispersed across a greater spatial extent, transiently depositing throughout the tidal cycle. However, due to the volumes of sediment likely to be liberated into the water column and significant dispersion of fine sediment, it is considered that deposition will be negligible with sediments quickly resuspended and redistributed under the forcing of tidal flows. Therefore, any deposition of sediment will be ‘light’, temporary in nature and will not adversely affect the integrity of the feature which, being a high energy environment with a relatively high natural level of sediment movement, is not
		Deposition of Sediment (Smothering)	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of estuary communities.	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
		Deposition of Sediment (Smothering)	Structure: species composition of component communities.	Restore the Species composition of component communities.	sensitive to effects at the predicted level. No discernible effects on normal sediment and water movement, or sediment composition are predicted. Considering the indiscernibleeffects predicted as a result of the Proposed Development, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is considered that there will be no adverse effects on site integrity from in combination effects of deposition of sediment (smothering).
		Deposition of Sediment (Smothering)	Structure: substrate composition and distribution	Maintain the distribution, composition and character of substrate across the feature (and each of its subfeatures).	
		Increased SSC	Supporting Processes: water quality - DO	Maintain the DO concentration at levels equating to High Ecological Status (specifically ≥ 5.7 mg per litre (at 35 salinity) for 95 % of the year), avoiding deterioration from existing levels.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2) indicate that, at this distance, there will be no connectivity from increased SSC with the SAC. For activities other than the deposition of dredged material, the worst-case activities which will lead to increased SSC are considered to be excavation at the HDD pits, and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations). It is predicted that peak SSCs of up to 200 mgl^{-1} may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl^{-1} are predicted. SSC is expected to return to background levels within a few days following completion of these activities. The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl-1) and therefore not discernible above natural variation. Natural variation ranges from approximately <5 to 75 mgl^{-1} in coastal areas, with annual averages of between 5 – 15 mgl^{-1} observed within surface waters. Subtidal sand habitats have a low sensitivity to increases in SSC as the species present are naturally found within high energy environments were sediment
		Increased SSC	Supporting Processes: water quality - nutrients	Restore water quality to mean winter dissolved inorganic nitrogen levels at which biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms) do not affect the integrity of the site and features.	
		Increased SSC	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of estuary communities.	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
		Increased SSC	Structure: species composition of component communities	Restore the Species composition of component communities.	mobility is common (Tillin, 2016), as such no effects on species composition or distribution are predicted. Furthermore, the Natural England Advice on Operations package lists this sub-feature as not sensitive to nutrients at any stage of construction, operation or decommissioning. Changes DO are not expected to be outwith normal levels and any effects to this attribute would be temporary and short term, returning to background on cessation of the activity. No effects on inorganic nitrogen levels are predicted. Therefore, considering the discreet events predicted which will be similar to natural variation already experienced, it is concluded that there will be no adverse effects on site integrity from increased SSC on this sub feature. Considering the indiscernible effects predicted as a result of the Proposed Development, the lack of sensitivity to the impact, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effect on site integrity from in combination increases in SSC.
		Increased SSC	Supporting Processes: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	
Subtidal seagrass beds	Maintaining or restoring: The extent and distribution of qualifying natural habitats and habitats of the qualifying species The structure and function (including typical species) of qualifying natural habitats The structure and function of the habitats of the qualifying species	Invasive species	Structure: non-native species and pathogens	Reduce the introduction and spread of non-native species and pathogens, and their impacts.	Application of best practice plans and procedures (see section 10.2.5) will be followed by all contractors and vessels. This will prevent INIS introduction as far as is reasonably practicable and will ensure that there will be no adverse effect on the integrity of the site as a result of invasive species. Due to the lack of predicted effects, along with the application of any similar best practice measures employed for any other plan and project identified, it is concluded that no in combination adverse effects on the integrity of the site will arise on this feature as a result of invasive species.
		Pollution	Supporting Processes: sediment contaminants	Restrict surface sediment contaminant levels to concentrations where they are not adversely impacting the infauna of the sub-feature.	Unplanned oil or chemical spillages from vessels may occur during all development phases. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events ocuccirng and therefore will not result in adverse effects on Site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
		Pollution	Supporting Processes: water quality - contaminants	Reduce aqueous contaminants to levels equating to High / Good Status (according to Annex VIII and X of the	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
	The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely The populations of each of the qualifying species The distribution of qualifying species within the site			WFD), avoiding deterioration from existing levels.	
		Deposition of sediment	Supporting Processes: sedimentation rate	Maintain the natural rate of sediment deposition.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km); which equates to disposal seaward of KP21 of the Marine Cable Corridor. Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there will be no sediment deposition with the SAC resulting from dredge disposal activities. Deposition from other cable installation activities (including excavation of HDD pits between KP1 and KP1.6) is not predicted to be significant, with any coarse material mobilised deposited rapidly (i.e. within several hundred metres of the cable trench). Finer sediment will be dispersed across a greater spatial extent, transiently depositing throughout the tidal cycle. However, due to the low volumes of sediment likely to be liberated into the water column and significant dispersion of fine sediment, it is considered that deposition will be negligible with sediments quickly resuspended and redistributed under the forcing of tidal flows. The mouth of Langstone harbour (the closest Estuary feature within the SAC containing this sub-feature) is approximately 1 km from the proposed HDD entry/exit pits (at their closest possible location), and therefore it is considered that it will be outwith the area where the majority of sediment is deposited. Therefore, any deposition of sediment resulting from the Proposed Development alone will be 'light', temporary in nature and will not adversely affect the integrity of the sub-feature, which due to its presence within an area of natural sediment accretion will be tolerant of the very low levels of deposition predicted. Considering the indiscernible effects predicted to result from the Proposed Development alone, and the fact that all other activities which may result from in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination effects of deposition of sediment (smothering).
		Deposition of Sediment (Smothering)	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of estuary communities.	
		Deposition of Sediment (Smothering)	Structure: species composition of component communities	Restore the Species composition of component communities.	
		Deposition of Sediment (Smothering)	Structure: substrate composition and distribution	Maintain the distribution, composition and character of substrate across the feature (and each of its subfeatures).	
		Increased SSC	Supporting Processes: water quality - DO	Maintain the DO concentration at levels equating to High Ecological Status (specifically ≥ 5.7 mg per litre (at 35 salinity) for 95	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there will be no connectivity between increased SSC / sediment plumes and the SAC resulting from the disposal of dredge material.

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
				% of the year), avoiding deterioration from existing levels.	For activities other than the deposition of dredged material, the worst-case activities which will lead to increased SSC are considered to be excavation at the HDD pit(s) (between KP1 and KP1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations). It is predicted that peak SSCs of up to 200 mgl^{-1} may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl^{-1} are predicted. SSC is expected to return to background levels within a few days following completion of these activities. The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl^{-1}) and therefore not discernible above natural variation. Natural variation ranges from approximately <5 to 75 mgl^{-1} in coastal areas, with annual averages of between 5 – 15 mgl^{-1} observed within surface waters. The mouth of Langstone harbour (the closest Estuary feature within the SAC within which this sub-feature is present) is approximately 1 km from the proposed HDD entry/exit pits (at their closest possible location). SSC variability within the harbour is high, owing to its tidal nature and frequent exposure to storm induced fluctuations (New Forest District Council, 2017). Suspended sediments within Langstone harbour have been measured at 200 mgl^{-1}, while measured SSC in nearby harbours have been recorded up to 100 mgl^{-1} (Portsmouth) (Humby and Dunn, 1975 – cited in New Forest District Council, 2017). Seagrass beds, although not tolerant to very high or long term increases in SSC (due to a reduction in photosynthesis and reduced oxygen levels), are tolerant to such short term isolated events as would be experienced as a result of the Proposed Development (D'Avack, et al., 2019). Seagrass beds are also located over a kilometre from the mouth of the harbour and as such are unlikely to be affected by very high levels of SSC with received levels well within normal background levels, and lower than peak levels experienced in this environment. Littoral beds are also able to photosynthesise during periods of exposure. No adverse changes to littoral seagrass bed function or distribution are therefore considered likely to arise as a result of the Proposed Development. In addition,
		Increased SSC	Supporting Processes: water quality - nutrients	Restore water quality to mean winter dissolved inorganic nitrogen levels at which biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms) do not affect the integrity of the site and features.	
		Increased SSC	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of estuary communities.	
		Increased SSC	Structure: species composition of component communities	Restore the Species composition of component communities.	
		Increased SSC	Supporting Processes: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
					according to in the Advice on Operations for this SAC, this sub feature is not considered sensitive to deoxygenation. No effect on the natural level of turbidity is predicted following cessation of the activity, and no effects in inorganic nitrogen levels are predicted. Therefore, the predicted levels of increased SSC, which will only persist for a short duration before returning to normal levels are not considered to lead to adverse effects on site integrity. Considering the indicernibleeffects predicted as a result of the Proposed Development, the general lack of sensitivity to the impact, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination effects of increases in SSC.
Mudflats and sandflats not submerged at low tide	Maintaining or restoring: The extent and distribution of qualifying natural habitats and habitats of the qualifying species The structure and function (including typical species) of qualifying natural habitats The structure and function of the habitats of the qualifying species The supporting processes on which qualifying natural	Invasive species	Structure: non-native species and pathogens	Reduce the introduction and spread of non-native species and pathogens, and their impacts.	Application of best practice plans and procedures (see section 10.2.5) will be followed by all contractors and vessels. This will prevent INIS introduction as far as is reasonably practicable and will ensure that there will be no adverse effects on the integrity of the site as a result of invasive species. Due to the lack of predicted effects, along with the application of any similar best practice measures employed for any other plan and project identified, it is concluded that no in combination adverse effects on the integrity of the site will arise on this feature as a result of invasive species.
		Pollution	Supporting Processes: sediment contaminants	Restrict surface sediment contaminants (<1cm from the surface) to below the OSPAR Environment Assessment Criteria (EAC) or Effects Range Low (ERL) threshold. For example, mean cadmium levels should be maintained below the ERL of 1.2 mg per kg.	Unplanned oil or chemical spillages from vessels may occur during all development phases. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurring and therefore will not result in adverse effects on Site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
		Pollution	Supporting Processes: water quality - contaminants	Reduce aqueous contaminants to levels equating to High / Good	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
	habitats and the habitats of qualifying species rely The populations of each of the qualifying species the distribution of qualifying species within the site			Status according to Annex VIII and X of the WFD, avoiding deterioration from existing levels.	
		Deposition of sediment	Supporting Processes: sediment movement and hydrodynamic regime	Maintain sediment transport pathways to and from the feature to ensure replenishment of the feature, and / or replenishment of habitats that rely on the sediment supply from the feature.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there will be no connectivity for sediment deposition with the SAC. Deposition from other cable installation activities (including excavation of HDD pits) is not predicted to be significant with any coarse material mobilised deposited rapidly (i.e. within several hundred metres of the cable trench and within comparable habitat types). Finer sediment will be dispersed across a greater spatial extent, transiently depositing throughout the tidal cycle. However, due to the volumes of sediment likely to be liberated into the water column and significant dispersion of fine sediment, it is considered that deposition will be negligible with sediments quickly resuspended and redistributed under the forcing of tidal flows. Therefore, any deposition of sediment resulting from the Proposed Development alone will be 'light', temporary in nature and will not adversely affect the integrity of the feature which is not sensitive to effects at this level. Considering the indiscernibleeffects predicted as a result of the Proposed Development alone, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from any in combination effects of deposition of sediment (smothering).
		Increased SSC	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of mudflat and sandflat communities according to the map.	For activities other than the deposition of dredged material, the worst-case activities which will lead to increased SSC are considered to be excavation at the HDD pits, and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations).

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
		Increased SSC	Structure: species composition of component communities	Restore the faunal quality of this feature to Good Status (a minimum mean Infaunal Quality Index (‘IQI’) score of ≥ 0.64), with no sustained deterioration within the status.	It is predicted that peak SSCs of up to 200 mgl-1 may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl-1 are predicted. SSC is expected to return to background levels within a few days following completion of these activities. The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl-1) and therefore not discernible above natural variation. Natural variation ranges from approximately <5 to 75 mgl-1 in coastal areas, with annual averages of between 5 – 15 mgl-1 observed within surface waters. Mudflat and sandflat habitats are not sensitive or have low sensitivity to increases in SSC. Therefore, considering the discreet events predicted which will be similar to natural variation already experienced, it is considered that there will be no effects on site integrity from increased SSC on mudflat and sandflat features and no adverse effects on faunal community structure or distribution. No discernible effect on the natural level of turbidity or DO is predicted following cessation of the activity, and no effects on inorganic nitrogen levels are predicted. Considering the indiscernibleeffects predicted as a result of the Proposed Development, the lack of sensitivity to the impact, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination increases in SSC.
		Increased SSC	Supporting Processes: water quality - nutrients	Restore water quality to mean winter dissolved inorganic nitrogen levels at which biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms) do not affect the integrity of the site and features.	
		Increased SSC	Supporting Processes: water quality - DO	Maintain the DO concentration at levels equating to High Ecological Status (specifically ≥ 5.7 mg per litre (at 35 salinity) for 95 % of the year), avoiding deterioration from existing levels.	
		Increased SSC	Supporting Processes: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
Sandbanks slightly covered by seawater all the time	Maintaining or restoring: The extent and distribution of qualifying natural habitats and habitats of the qualifying species The structure and function (including typical species) of qualifying natural habitats The structure and function of the habitats of the qualifying species The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely The populations of each of the qualifying species The distribution of qualifying species within the site	Invasive species	Structure: non-native species and pathogens	Reduce the introduction and spread of non-native species and pathogens, and their impacts.	Application of best practice plans and procedures (see section 10.2.5) will be followed by all contractors and vessels. This will prevent INIS introduction as far as is reasonably practicable and will ensure that there will be no adverse effect on the integrity of the site as a result of invasive species. Due to the lack of predicted effects, along with the application of any similar best practice measures employed for any other plan and project identified, it is concluded that no in combination adverse effects will arise on this feature as a result of invasive species.
		Pollution	Supporting Processes: sediment contaminants	Restrict surface sediment contaminant levels to concentrations where they are not adversely impacting the infauna of the feature (and each of its sub-features).	Unplanned oil or chemical spillages from vessels may occur during all development phases. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on Site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
		Pollution	Supporting Processes: water quality - contaminants	Reduce aqueous contaminants to levels equating to High / Good Status according to Annex VIII and X of the WFD, avoiding deterioration from existing levels.	
		Deposition of sediment	Supporting Processes: sediment movement and hydrodynamic regime	Maintain all hydrodynamic and physical conditions such that natural water flow and sediment movement are not significantly altered or prevented from responding to changes in environmental conditions.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there will be no connectivity for sediment deposition with the SAC. Deposition from other cable installation activities (including excavation of HDD pits) is not predicted to be significant with any coarse material mobilised deposited rapidly (i.e. within several hundred metres of the cable trench and within comparable habitat types). Finer sediment will be dispersed across a greater spatial extent, transiently depositing throughout the tidal cycle. However, due to the volumes of sediment likely to be liberated into the water column and significant

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
		Deposition of Sediment (Smothering)	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of subtidal sandbank communities according to the map.	dispersion of fine sediment, it is considered that deposition will be negligible with sediments quickly resuspended and redistributed under the forcing of tidal flows. Therefore, any deposition of sediment resulting from the Proposed Development alone will be 'light', temporary in nature and will not adversely affect the integrity of the feature which is not sensitive to effects at this level. No discernible effects on normal sediment and water movement, or sediment composition are predicted. Considering the indiscernibleeffects predicted as a result of the Proposed Development alone, and the fact that all other activities which may result from in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination effects of deposition of sediment (smothering).
		Deposition of Sediment (Smothering)	Structure: species composition of component communities	Restore the Species composition of component communities.	
		Deposition of Sediment (Smothering)	Structure: sediment composition and distribution	Maintain the distribution of sediment composition types across the feature (and each of its sub-features) (presence / absence of areas mapped in GIS), compared to an established baseline, to ensure continued structural habitat integrity and connectivity.	
		Increased SSC	Supporting Processes: water quality - DO	Maintain the DO concentration at levels equating to High Ecological Status (specifically ≥ 5.7 mg per litre (at 35 salinity) for 95 % of the year), avoiding deterioration from existing levels.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2) indicate that, at this distance, there will be no connectivity from increased SSC with the SAC. For activities other than the deposition of dredged material, the worst-case activities which will lead to increased SSC are considered to be excavation at the HDD pits, and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations). It is predicted that peak SSCs of up to 200 mgl-1 may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl-1 are predicted. SSC is expected
		Increased SSC	Supporting Processes: water quality - nutrients	Restore water quality to mean winter dissolved inorganic nitrogen levels at which biological indicators of	

Feature/Sub-features	Conservation Objective	Effect	Attribute	Target	Assessment
				eutrophication (opportunistic macroalgal and phytoplankton blooms) do not affect the integrity of the site and features.	to return to background levels within a few days following completion of these activities. The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl-1) and therefore not discernible above natural variation. Natural variation ranges from approximately <5 to 75 mgl-1 in coastal areas, with annual averages of between 5 – 15 mgl-1 observed within surface waters. Mudflat and sandflat habitats are not sensitive or have low sensitivity to increases in SSC. Therefore, considering the discreet events predicted which will be similar to natural variation already experienced, no effects on species composition or distribution are predicted. Furthermore, the Natural England Advice on Operations package lists this sub-feature as not sensitive to nutrients at any stage of construction, operation or decommissioning. Changes DO are not expected to be outwith normal levels and any effects to this attribute would be temporary and short term, returning to background on cessation of the activity. No effects on inorganic nitrogen levels are predicted. It is therefore concluded that there will be no adverse effects on site integrity from increased SSC on Sandbanks slightly covered by seawater all the time. Considering the indiscernibleeffects predicted as a result of the Proposed Development, the lack of sensitivity to the impact, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination increases in SSC.
		Increased SSC	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of subtidal sandbank communities according to the map.	
		Increased SSC	Structure: species composition of component communities	Restore the Species composition of component communities.	
		Increased SSC	Supporting Processes: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	
Conclusion: No adverse effect on site integrity can be concluded for the Solent Maritime SAC, arising from either the Proposed Development alone, or in combination with other plans or projects.					

10.11. MARINE: SOUTH WIGHT MARITIME SAC

10.11.1. OVERVIEW

10.11.1.1. The South Wight Maritime SAC runs the full length of the south coast of the Isle of Wight, from the sea stacks of the Needles in the west to Bembridge Point in the east. The designated features for which LSE could not be ruled out within this SAC were: **Reefs** and **Submerged or partially submerged sea caves.**

10.11.2. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES)

10.11.2.1. Site-specific SACO is available for the Solent Maritime SAC[50].

10.11.2.2. Table 10.21 lists those attributes which are considered to be equivalent to those impacts for which an LSE could not be excluded.

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50 https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK0030061&SiteName=solent&SiteNameDisplay=South+Wight+Maritime+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=0 Accessed October 2019

Table 10.21 - SACO attributes screened in for assessment

Feature/Sub-feature	Effect for which LSE could not be excluded	Equivalent attribute
Reefs **Circalittoral rock** **Infralittoral rock** **Intertidal rock** **Subtidal stony reef**	Increased SSC Deposition of sediment (smothering)	Supporting processes: sedimentation rate Distribution: presence and spatial distribution of biological communities 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
	Pollution	Supporting processes: water quality – contaminants Supporting processes: sediment contaminants
	Invasive Species	Structure: non-native species and pathogens
Submerged or partially submerged sea caves	Pollution	Supporting processes: sediment contaminants
	Invasive Species	Structure: non-native species and pathogens
	Increased SSC Deposition of sediment (smothering)	Supporting processes: sedimentation rate Distribution: presence and spatial distribution of biological communities 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

10.11.2.3. All other attribute/receptor combinations present within the Supplementary Advice on Conservation Objectives for this SAC were deemed to not be relevant to the effects screened into the AA.

10.11.3. ASSESSMENT OF POTENTIAL ADVERSE EFFECTS ON SITE INTEGRITY

10.11.3.1. For those designated features where LSE could not be excluded in Section 7, an assessment of potential adverse effects on site integrity is presented in Table 10.22 below.

10.11.3.2. It is concluded that there will be no adverse effect on site integrity for the South Wight Maritime SAC, either from the Proposed Development alone, or in combination with other plans or projects, following the application of mitigation.

Table 10.22 - Assessment of potential adverse effects on site integrity for the South Wight Maritime SAC across all phases of the Proposed Development

Feature/Sub-features	Conservation Objective	Effect	Attribute taken through to AA	Target	Assessment
Reefs	maintaining or restoring: the extent and distribution of qualifying natural habitats and habitats of the qualifying species the structure and function (including typical species) of qualifying natural habitats the structure and function of the habitats of the qualifying species the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely the populations of each of the qualifying species	Invasive Species	Structure: non-native species and pathogens	Restrict the introduction and spread of non-native species and pathogens, and their impacts.	Application of best practice plans and procedures (see section 10.2.5) will be followed by all contractors and vessels. This will prevent INIS introduction as far as is reasonably practicable and will ensure that there will be no adverse effects on the integrity of the site as a result of invasive species. Due to the lack of predicted effects, along with the application of any similar best practice measures employed for any other plan and project identified, it is concluded that no in combination adverse effects will arise on this feature as a result of invasive species.
		Deposition of sediment	Supporting processes: sedimentation rate	Maintain the natural rate of sediment deposition.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km); which equates to disposal seaward of KP21 of the Marine Cable Corridor. Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there no will be sediment deposition with the SAC resulting from dredge disposal activities. Deposition from other cable installation activities (including excavation of HDD pits between KP1 and KP1.6) is not predicted to be significant, with any coarse material mobilised deposited rapidly (i.e. within several hundred metres of the cable trench). Finer sediment will be dispersed across a greater spatial extent, transiently depositing throughout the tidal cycle. However, due to the volumes of sediment likely to be liberated into the water column and significant dispersion of fine sediment, it is considered that deposition will be negligible with sediments quickly resuspended and redistributed under the forcing of tidal flows. The closest Reef feature within the SAC is approximately 3.3 km from the proposed HDD entry/exit pits (at their closest possible location), and therefore it is considered that it will be outwith the area where the majority of sediment is deposited. Therefore, any deposition of sediment will be light, temporary in nature and will not adversely affect the integrity of the feature which is not sensitive to effects at this level. On cessation of activities normal rates of deposition will return, and no effects on distribution and composition of communities, or on the availability or structural integrity of features, are predicted. Considering the indiscernibleeffects predicted to result from the Proposed Development, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there is no potential for adverse effects on site integrity from in combination deposition of sediment (smothering).
		Deposition of sediment	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of intertidal rock communities according to the map.	
		Deposition of sediment	Structure: species composition of component communities	Maintain the species composition of component communities.	
		Deposition of sediment	Structure: substrate composition and distribution	Maintain the surface and structural complexity, and the stability of the reef structure.	

Feature/Sub-features	Conservation Objective	Effect	Attribute taken through to AA	Target	Assessment
	the distribution of qualifying species within the site	Pollution	Supporting processes: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will make prevent these events occurring and therefore will not result in adverse effects on Site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
		Pollution	Supporting processes: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	
		Increased SSC	Supporting processes: water quality - DO	Maintain the DO concentration [at / to] levels equating to [Good / High] Ecological Status [(specifically ≥ XX mg per litre (at 35 salinity) for 95 % of the year)], avoiding deterioration from existing levels.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there will be no connectivity between increased SSC / sediment plumes and the SAC resulting from the disposal of dredge material. For activities other than the deposition of dredged material, the worst-case activities which will lead to increased SSC are considered to be excavation at the HDD pit(s) (between KP1 and KP1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations). It is predicted that peak SSCs of up to 200 mgl-1 may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be

Feature/Sub-features	Conservation Objective	Effect	Attribute taken through to AA	Target	Assessment
		Increased SSC	Supporting processes: water quality – nutrients	Maintain water quality at mean winter dissolved inorganic nitrogen levels where biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms) do not affect the integrity of the site and features	transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl-1 are predicted. SSC is expected to return to background levels within a few days following completion of these activities. The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl-1) and therefore not discernible above natural variation. Natural variation ranges from approximately <5 to 75 mgl-1 in coastal areas, with annual averages of between 5 – 15 mgl-1 observed within surface waters. Most habitats present within reef environments are not sensitive to increases in SSC, with those that are sensitive considered tolerant to such short-term isolated events as would be experienced as a result of the Proposed Development (see sub-feature assessments below). Therefore, it is considered that there will be no adverse effects on site integrity from increased SSC on reef features. On cessation of activities, normal levels of turbidity and DO will return, and effects on distribution and composition of communities, or on the levels of inorganic nitrogen, are not predicted. Considering the indiscerniblepredicted as a result of the Proposed Development alone, the general lack of sensitivity to the impact, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination increases in SSC.
		Increased SSC	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of intertidal rock communities according to the map.	
		Increased SSC	Structure: species composition of component communities	Maintain the species composition of component communities.	
		Increased SSC	Supporting processes: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material)	

Feature/Sub-features	Conservation Objective	Effect	Attribute taken through to AA	Target	Assessment
				across the habitat.	
Circalittoral Rock	maintaining or restoring: the extent and distribution of qualifying natural habitats and habitats of the qualifying species the structure and function (including typical species) of qualifying natural habitats the structure and function of the habitats of the qualifying species the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely the populations of each of the qualifying species	Invasive Species	Structure: non-native species and pathogens	Restrict the introduction and spread of non-native species and pathogens, and their impacts.	Application of best practice plans and procedures (see section 10.2.5) will be followed by all contractors and vessels. This will preventINIS introduction as far as is reasonably practicable and will ensure that there will be no adverse effects on the integrity of the site as a result of invasive species. Due to the lack of predicted effects, along with the application of any similar best practice measures employed for any other plan and project identified, it is concluded that no in combination adverse effects will arise on this feature as a result of invasive species.
		Deposition of sediment	Supporting processes: sedimentation rate	Maintain the natural rate of sediment deposition.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km); which equates to disposal seaward of KP21 of the Marine Cable Corridor. Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there no will be sediment deposition with the SAC resulting from dredge disposal activities. Deposition from other cable installation activities (including excavation of HDD pits between KP1 and KP1.6) is not predicted to be significant, with any coarse material mobilised deposited rapidly (i.e. within several hundred metres of the cable trench). Finer sediment will be dispersed across a greater spatial extent, transiently depositing throughout the tidal cycle. However, due to the volumes of sediment likely to be liberated into the water column and significant dispersion of fine sediment, it is considered that deposition will be negligible with sediments quickly resuspended and redistributed under the forcing of tidal flows. The closest Reef feature within the SAC is approximately 3.3 km from the proposed HDD entry/exit pits (at their closest possible location), and therefore it is considered that it will be outwith the area where the majority of sediment is deposited. Therefore, any deposition of sediment will be light, temporary in nature and will not adversely affect the integrity of the feature which is not sensitive to effects at this level. On cessation of activities normal rates of deposition will return, and no effects on distribution and composition of communities, or on the availability or structural integrity of features, are predicted. Considering the indiscernibleeffects predicted to result from the Proposed Development, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination effects of deposition of sediment (smothering).
		Deposition of Sediment (Smothering)	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of intertidal rock communities according to the map.	
		Deposition of Sediment (Smothering)	Structure: species composition of component communities	Restore the Species composition of component communities.	
		Deposition of Sediment (Smothering)	Structure: physical structure of rocky substrate	Maintain the surface and structural complexity, and the stability of the reef structure.	

Feature/Sub-features	Conservation Objective	Effect	Attribute taken through to AA	Target	Assessment
	the distribution of qualifying species within the site	Increased SSC	Supporting processes: water quality - DO	Maintain the DO concentration [at / to] levels equating to [Good / High] Ecological Status [(specifically ≥ XX mg per litre (at 35 salinity) for 95 % of the year)], avoiding deterioration from existing levels.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there will be no connectivity between increased SSC / sediment plumes and the SAC resulting from the disposal of dredge material. For activities other than the deposition of dredged material, the worst-case activities which will lead to increased SSC are considered to be excavation at the HDD pit(s) (between KP1 and KP1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations). It is predicted that peak SSCs of up to 200 mgl-1 may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl-1 are predicted. SSC is expected to return to background levels within a few days following completion of these activities. The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl-1) and therefore not discernible above natural variation. Natural variation ranges from approximately <5 to 75 mgl-1 in coastal areas, with annual averages of between 5 – 15 mgl-1 observed within surface waters. The closest reef feature within the SAC is approximately 3.3 km from the proposed HDD entry/exit pits (at their closest possible location), and therefore it is considered that it will be outwith the area of highest SSC. Increases in SSC can affect feeding efficiency of filter feeding species and can increase scour in tide swept areas (Readman, 2016). The likely received levels of sediment at the location of this subfeature are however likely to be very similar or within the natural background concentrations present, and as such the communities are likely to be well adapted to this level of effect. No changes in community composition or abundances will arise. . Therefore, it is concluded that there will be no adverse effects on site integrity from increased SSC on reef features resulting from the Proposed Development alone. On cessation of activities, normal levels of turbidity and DO will return, and effects on the levels of inorganic nitrogen are not predicted.
		Increased SSC	Supporting processes: water quality – nutrients	Maintain water quality at mean winter dissolved inorganic nitrogen levels where biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms) do not affect the integrity of the site and features	
		Increased SSC	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of intertidal rock communities according to the map.	

Feature/Sub-features	Conservation Objective	Effect	Attribute taken through to AA	Target	Assessment
		Increased SSC	Structure: species composition of component communities	Maintain the species composition of component communities.	Considering the indiscernible effects predicted as a result of the Proposed Development alone, the general lack of sensitivity to the impact, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination effects from increases in SSC.
		Increased SSC	Supporting processes: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	
Infralittoral Rock	maintaining or restoring: the extent and distribution of qualifying natural habitats and habitats of the qualifying species the structure and function (including typical species) of qualifying natural habitats the structure and function of the habitats of the	Invasive Species	Structure: non-native species and pathogens	Restrict the introduction and spread of non-native species and pathogens, and their impacts.	Application of best practice plans and procedures (see section 10.2.5) will be followed by all contractors and vessels. This will prevent INIS introduction as far as is reasonably practicable and will ensure that there will be no adverse effects on the integrity of the site as a result of invasive species. Due to the lack of predicted effects, along with the application of any similar best practice measures employed for any other plan and project identified, it is concluded that no in combination adverse effects will arise on this feature as a result of invasive species.
		Deposition of sediment	Supporting processes: sedimentation rate	Maintain the natural rate of sediment deposition.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km); which equates to disposal seaward of KP21 of the Marine Cable Corridor. Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there no will be sediment deposition with the SAC resulting from dredge disposal activities. Deposition from other cable installation activities (including excavation of HDD pits between KP1 and KP1.6) is not predicted to be significant, with any coarse material mobilised deposited rapidly (i.e. within several hundred metres of the cable trench). Finer sediment will be dispersed across a greater spatial extent, transiently depositing throughout the tidal cycle. However, due to the volumes of sediment likely to be liberated into the water column and
		Deposition of Sediment (Smothering)	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of intertidal rock communities according to the map.	

Feature/Sub-features	Conservation Objective	Effect	Attribute taken through to AA	Target	Assessment
	qualifying species the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely the populations of each of the qualifying species the distribution of qualifying species within the site	Deposition of Sediment (Smothering)	Structure: species composition of component communities	Maintain the species composition of component communities.	significant dispersion of fine sediment, it is considered that deposition will be negligible with sediments quickly resuspended and redistributed under the forcing of tidal flows. The closest Reef feature within the SAC is approximately 3.3 km from the proposed HDD entry/exit pits (at their closest possible location), and therefore it is considered that it will be outwith the area where the majority of sediment is deposited. Therefore, any deposition of sediment will be light, temporary in nature and will not adversely affect the integrity of the feature which is not sensitive to effects at this level. On cessation of activities normal rates of deposition will return, and no effects on distribution and composition of communities, or on the availability or structural integrity of features, are predicted. Considering the indiscernibleeffects predicted to result from the Proposed Development, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination deposition of sediment (smothering), either alone or in combination with other project and plans.
		Deposition of Sediment (Smothering)	Structure: physical structure of rocky substrate	Maintain the surface and structural complexity, and the stability of the reef structure.	
		Pollution	Supporting processes: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurring and therefore will not result in adverse effects on Site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
		Increased SSC	Supporting processes: water quality - DO	Maintain the DO concentration [at / to] levels equating to [Good / High] Ecological Status [(specifically ≥ XX mg per litre (at 35 salinity) for 95 % of the year)],	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there will be no connectivity between increased SSC / sediment plumes and the SAC resulting from the disposal of dredge material. For activities other than the deposition of dredged material, the worst-case activities which will lead to increased SSC are considered to be excavation at the HDD pit(s) (between KP1 and KP1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations).

Feature/Sub-features	Conservation Objective	Effect	Attribute taken through to AA	Target	Assessment
				avoiding deterioration from existing levels.	It is predicted that peak SSCs of up to 200 mgl-1 may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl-1 are predicted. SSC is expected to return to background levels within a few days following completion of these activities. The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl-1) and therefore not discernible above natural variation. Natural variation ranges from approximately <5 to 75 mgl-1 in coastal areas, with annual averages of between 5 – 15 mgl-1 observed within surface waters. The closest reef feature within the SAC is approximately 3.3 km from the proposed HDD entry/exit pits (at their closest possible location), and therefore it is considered that it will be outwith the area of highest SSC. Increases in SSC can affect feeding efficiency of filter feeding species and can increase scour in tide swept areas (Readman, 2016). The likely received levels of sediment at the location of this subfeature are within the natural background concentrations present, and as such the communities will bewell adapted to this level of effect. As such, no changes in community composition or abundances will arise. Therefore, it is concluded that there will be no adverse effects on site integrity from increased SSC on reef features resulting from the Proposed Development alone. On cessation of activities, within days normal levels of turbidity and DO will return, and no effects on the levels of inorganic nitrogen are predicted. Considering the indiscernible effects predicted as a result of the Proposed Development alone, the general lack of sensitivity to the impact, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination effects from increases in SSC.
		Increased SSC	Supporting processes: water quality – nutrients	Maintain water quality at mean winter dissolved inorganic nitrogen levels where biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms) do not affect the integrity of the site and features	
		Increased SSC	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of intertidal rock communities according to the map.	
		Increased SSC	Structure: species composition of component communities	Maintain the species composition of component communities.	
		Increased SSC	Supporting processes: water quality - turbidity	Maintain natural levels of turbidity (e.g.	

Feature/Sub-features	Conservation Objective	Effect	Attribute taken through to AA	Target	Assessment
				concentrations of suspended sediment, plankton and other material) across the habitat.	
Intertidal Rock	maintaining or restoring: the extent and distribution of qualifying natural habitats and habitats of the qualifying species the structure and function (including typical species) of qualifying natural habitats the structure and function of the habitats of the qualifying species the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely the populations of	Invasive Species	Structure: non-native species and pathogens	Restrict the introduction and spread of non-native species and pathogens, and their impacts.	Application of best practice plans and procedures (see section 10.2.5) will be followed by all contractors and vessels. This will prevent INIS introduction as far as is reasonably practicable and will ensure that there will be no adverse effects on the integrity of the site as a result of invasive species. Due to the lack of predicted effects, along with the application of any similar best practice measures employed for any other plan and project identified, it is concluded that no in combination adverse effects will arise on this feature as a result of invasive species.
		Deposition of sediment	Supporting processes: sedimentation rate	Maintain the natural rate of sediment deposition.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km); which equates to disposal seaward of KP21 of the Marine Cable Corridor. Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there no will be sediment deposition with the SAC resulting from dredge disposal activities. Deposition from other cable installation activities (including excavation of HDD pits between KP1 and KP1.6) is not predicted to be significant, with any coarse material mobilised deposited rapidly (i.e. within several hundred metres of the cable trench). Finer sediment will be dispersed across a greater spatial extent, transiently depositing throughout the tidal cycle. However, due to the volumes of sediment likely to be liberated into the water column and significant dispersion of fine sediment, it is considered that deposition will be negligible with sediments quickly resuspended and redistributed under the forcing of tidal flows. The closest intertidal rock habitat within the SAC is approximately 10 km from the proposed HDD entry/exit pits (at their closest possible location), and therefore it is concluded that it will be outwith the area where any sediment is deposited. Sediment deposition will therefore not adversely affect the integrity of the feature as no effects are considered possible. In addition, due to the fact that no effects are predicted from the project alone through deposition of sediment, no in-combination adverse effects are considered possible.
		Deposition of Sediment (Smothering)	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of intertidal rock communities according to the map.	
		Deposition of Sediment (Smothering)	Structure: species composition of component communities	Maintain the species composition of component communities.	
		Deposition of Sediment (Smothering)	Structure: physical structure of rocky substrate	Maintain the surface and structural complexity, and	

Feature/Sub-features	Conservation Objective	Effect	Attribute taken through to AA	Target	Assessment
	each of the qualifying species			the stability of the reef structure	
	the distribution of qualifying species within the site	Pollution	Supporting processes: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on Site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
		Increased SSC	Supporting processes: water quality - DO	Maintain the DO concentration [at / to] levels equating to [Good / High] Ecological Status [(specifically ≥ XX mg per litre (at 35 salinity) for 95 % of the year)], avoiding deterioration from existing levels.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2) indicate that, at this distance, there will be no connectivity from increased SSC with the SAC. For activities other than the deposition of dredged material, the worst-case activities which will lead to increased SSC are considered to be excavation at the HDD pits, and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations). It is predicted that peak SSCs of up to 200 mgl-1 may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl-1 are predicted. SSC is expected to return to background levels within a few days following completion of these activities. The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl-1) and therefore not discernible above natural variation. The closest intertidal rock habitat within the SAC is approximately 10 km from the proposed HDD entry/exit pits (at their closest possible location), and therefore it is considered that it will be outwith the area of significantly increased SSC, with any received levels not discernible within the natural background of variation present. Natural variation ranges from approximately
		Increased SSC	Supporting processes: water quality – nutrients	Maintain water quality at mean winter dissolved inorganic nitrogen levels where biological indicators of eutrophication (opportunistic macroalgal and	

Feature/Sub-features	Conservation Objective	Effect	Attribute taken through to AA	Target	Assessment
				phytoplankton blooms) do not affect the integrity of the site and features	<5 to 75 mgl-1 in coastal areas, with annual averages of between 5 – 15 mgl-1 observed within surface waters. Considering the received levels predicted, no changes to community composition or distributions are predicted, and accordingly no effects on the integrity of the feature are predicted. As the received levels will be within the natural background of SSC typically experienced, there will be no effects on turbidity or DO and no effects on distribution and composition of communities, or on the levels of inorganic nitrogen. . Considering the indiscernible effects predicted as a result of the Proposed Development, the lack of sensitivity to the impact, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination effects from increases in SSC.
		Increased SSC	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of intertidal rock communities according to the map.	
		Increased SSC	Structure: species composition of component communities	Maintain the species composition of component communities.	
		Increased SSC	Supporting processes: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	
Subtidal stony reef	maintaining or restoring: the extent and distribution of qualifying natural habitats and habitats	Invasive Species	Structure: non-native species and pathogens	Restrict the introduction and spread of non-native species and pathogens, and their impacts.	Application of best practice plans and procedures (see section 10.2.5) will be followed by all contractors and vessels. This will prevent INIS introduction as far as is reasonably practicable and will ensure that there will be no adverse effects on the integrity of the site as a result of invasive species. Due to the lack of predicted effects, along with the application of any similar best practice measures employed for any other plan and project identified, it is concluded that no in combination adverse effects will arise on this feature as a result of invasive species.

Feature/Sub-features	Conservation Objective	Effect	Attribute taken through to AA	Target	Assessment
	of the qualifying species the structure and function (including typical species) of qualifying natural habitats the structure and function of the habitats of the qualifying species the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely the populations of each of the qualifying species	Deposition of sediment	Supporting processes: sedimentation rate	Maintain the natural rate of sediment deposition.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km); which equates to disposal seaward of KP21 of the Marine Cable Corridor. Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there no will be sediment deposition with the SAC resulting from dredge disposal activities. Deposition from other cable installation activities (including excavation of HDD pits between KP1 and KP1.6) is not predicted to be significant, with any coarse material mobilised deposited rapidly (i.e. within several hundred metres of the cable trench). Finer sediment will be dispersed across a greater spatial extent, transiently depositing throughout the tidal cycle. However, due to the volumes of sediment likely to be liberated into the water column and significant dispersion of fine sediment, deposition will be negligible with sediments quickly resuspended and redistributed under the forcing of tidal flows. The closest Reef feature within the SAC is approximately 3.3 km from the proposed HDD entry/exit pits (at their closest possible location), and therefore it is considered that it will be outwith the area where the majority of sediment is deposited. Therefore, any deposition of sediment will be light, temporary in nature and will not adversely affect the integrity of the feature which is not sensitive to effects at this level. On cessation of activities normal rates of deposition will return, and no effects on distribution and composition of communities, or on the availability or structural integrity of features, are predicted. Considering the indiscernibleeffects predicted to result from the Proposed Development, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination effects from deposition of sediment (smothering).
		Deposition of Sediment (Smothering)	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of intertidal rock communities according to the map.	
		Deposition of Sediment (Smothering)	Structure: species composition of component communities	Maintain the species composition of component communities.	
		Deposition of Sediment (Smothering)	Structure: physical structure of rocky substrate	Maintain the surface and structural complexity, and the stability of the reef structure.	
	the distribution of qualifying species within the site	Pollution	Supporting processes: water quality - contaminants	Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	Unplanned oil or chemical spillages from vessels may occur during all development phases. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurring and therefore will not result in adverse effects on site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.

Feature/Sub-features	Conservation Objective	Effect	Attribute taken through to AA	Target	Assessment
		Increased SSC	Supporting processes: water quality - DO	Maintain the DO concentration [at / to] levels equating to [Good / High] Ecological Status [(specifically ≥ XX mg per litre (at 35 salinity) for 95 % of the year)], avoiding deterioration from existing levels.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there will be no connectivity between increased SSC / sediment plumes and the SAC resulting from the disposal of dredge material. For activities other than the deposition of dredged material, the worst-case activities which will lead to increased SSC are considered to be excavation at the HDD pit(s) (between KP1 and KP1.6), and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations). It is predicted that peak SSCs of up to 200 mgl-1 may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl-1 are predicted. SSC is expected to return to background levels within a few days following completion of these activities. The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl-1) and therefore not discernible above natural variation. Natural variation ranges from approximately <5 to 75 mgl-1 in coastal areas, with annual averages of between 5 – 15 mgl-1 observed within surface waters. The closest reef feature within the SAC is approximately 3.3 km from the proposed HDD entry/exit pits (at their closest possible location), and therefore it is considered that it will be outwith the area of highest SSC. Increases in SSC can affect feeding efficiency of filter feeding species and can increase scour in tide swept areas (Readman, 2016). The likely received levels of sediment at the location of this subfeature are however within the natural background concentrations present, and as such the communities are well adapted to this level of effect. As such, no changes in community composition or abundances are considered likely to arise. Therefore, it is considered that there will be no adverse effects on site integrity from increased SSC on reef features resulting from the Proposed Development alone. On cessation of activities, normal levels of turbidity and DO will return, and no effects on the levels of inorganic nitrogen are predicted. Considering the indiscernible effects predicted as a result of the Proposed Development alone, the general lack of sensitivity to the impact, and the fact that all other activities which may
		Increased SSC	Supporting processes: water quality – nutrients	Maintain water quality at mean winter dissolved inorganic nitrogen levels where biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms) do not affect the integrity of the site and features	
		Increased SSC	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of intertidal rock communities according to the map.	

Feature/Sub-features	Conservation Objective	Effect	Attribute taken through to AA	Target	Assessment
		Increased SSC	Structure: species composition of component communities	Maintain the species composition of component communities.	result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination increases in SSC.
		Increased SSC	Supporting processes: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	
Submerged or partially submerged sea caves	maintaining or restoring: the extent and distribution of qualifying natural habitats and habitats of the qualifying species the structure and function (including typical species) of qualifying natural habitats the structure and function of the habitats of the qualifying species	Invasive species	Structure: non-native species and pathogens	Restrict the introduction and spread of non-native species and pathogens, and their impacts.	Application of best practice plans and procedures (see section 10.2.5) will be followed by all contractors and vessels. This will prevent INIS introduction as far as is reasonably practicable and will ensure that there will be no adverse effects on the integrity of the site as a result of invasive species. Due to the lack of predicted effects, along with the application of any similar best practice measures employed for any other plan and project identified, it is concluded that no in combination adverse effects will arise on this feature as a result of invasive species.
		Pollution	Supporting processes: sediment contaminants	Restrict surface sediment contaminant levels to concentrations where they are not adversely impacting the infauna of the feature.	Unplanned oil or chemical spillages from vessels may occur during all development phases. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on Site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
		Pollution	Supporting processes: water	Restrict aqueous contaminants to levels equating to	

Feature/Sub-features	Conservation Objective	Effect	Attribute taken through to AA	Target	Assessment
	the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely the populations of each of the qualifying species the distribution of qualifying species within the site		quality - contaminants	High Status according to Annex VIII and Good Status according to Annex X of the WFD, avoiding deterioration from existing levels.	
		Deposition of Sediment (Smothering)	Supporting processes: sedimentation rate	Maintain the natural rate of sediment deposition.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km); which equates to disposal seaward of KP21 of the Marine Cable Corridor. Results of sediment plume dispersion modelling (Appendix 6.2 of ES) indicate that, at this distance, there no will be sediment deposition with the SAC resulting from dredge disposal activities. Deposition from other cable installation activities (including excavation of HDD pits between KP1 and KP1.6) is not predicted to be significant, with any coarse material mobilised deposited rapidly (i.e. within several hundred metres of the cable trench). Finer sediment will be dispersed across a greater spatial extent, transiently depositing throughout the tidal cycle. However, due to the volumes of sediment likely to be liberated into the water column and significant dispersion of fine sediment, it is considered that deposition will be negligible with sediments quickly resuspended and redistributed under the forcing of tidal flows. The closest Submerged or partially submerged sea caves feature within the SAC is approximately 10 km from the proposed HDD entry/exit pits (at their closest possible location), and therefore it is considered that it will be outwith the area where any sediment is deposited. Sediment deposition will therefore not adversely affect the integrity of the feature as no effects are considered possible. In addition, due to the fact that no effects are predicted from the project alone through deposition of sediment, no in-combination adverse effects are considered possible.
		Deposition of Sediment (Smothering)	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of sea cave communities according to the map.	
		Deposition of Sediment (Smothering)	Structure: species composition of component communities	Maintain the species composition of component communities.	
		Deposition of Sediment (Smothering)	Structure: physical structure of rocky substrate	Maintain the surface and structural complexity, and the stability of the rocky structure within the cave.	

Feature/Sub-features	Conservation Objective	Effect	Attribute taken through to AA	Target	Assessment
		Increased SSC	Supporting processes: water quality - DO	Maintain the DO concentration [at / to] levels equating to [Good / High] Ecological Status [(specifically ≥ XX mg per litre (at 35 salinity) for 95 % of the year)], avoiding deterioration from existing levels.	Mitigation is proposed to restrict sediment disposal activities to outwith WFD waters (plus a buffer of 3 km). Results of sediment plume dispersion modelling (Appendix 6.2) indicate that, at this distance, there will be no connectivity from increased SSC with the SAC. For activities other than the deposition of dredged material, the worst-case activities which will lead to increased SSC are considered to be excavation at the HDD pits, and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations). It is predicted that peak SSCs of up to 200 mgl-1 may be observed locally (i.e. within 2 km of the cable trench or HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench or pit at which point concentrations of 5 to 10 mgl-1 are predicted. SSC is expected to return to background levels within a few days following completion of these activities. The finest sediments will potentially be transported up to 6-10 km in the nearshore area, however SSCs at these distances will be low (< 5 mgl-1) and therefore not discernible above natural variation. The closest Submerged or partially submerged sea caves feature within the SAC is approximately 10 km from the proposed HDD entry/exit pits (at their closest possible location), and therefore it is considered that it will be outwith the area of significantly increased SSC, with any received levels not discernible within the natural background of variation present. Natural Variation ranges from approximately <5 to 75 mgl-1 in coastal areas, with annual averages of between 5 – 15 mgl-1 observed within surface waters. Submerged and partially submerged cave habitats are not sensitive or have low sensitivity to increases in SSC, and considering the received levels predicted, no effects on the integrity of the feature are predicted. As the received levels are predicted to be within the natural background of SSC typically experienced, no effects on turbidity or DO are predicted, and no effects on distribution and composition of communities, or on the levels of inorganic nitrogen, are envisaged. Considering the indiscernible effects predicted as a result of the Proposed Development, the lack of sensitivity to the impact, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination effects from increases in SSC.
		Increased SSC	Supporting processes: water quality – nutrients	Maintain water quality at mean winter dissolved inorganic nitrogen levels where biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms) do not affect the integrity of the site and features, avoiding deterioration from existing levels.	
		Increased SSC	Distribution: presence and spatial distribution of biological communities	Maintain the presence and spatial distribution of intertidal rock communities according to the map	

Feature/Sub-features	Conservation Objective	Effect	Attribute taken through to AA	Target	Assessment
		Increased SSC	Structure: species composition of component communities	Maintain the species composition of component communities.	
		Increased SSC	Supporting processes: water quality - turbidity	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.	
Conclusion: No adverse effect on site integrity can be concluded for the South wight maritime SAC, arising from either the Proposed Development alone, or in combination with other plans or projects.					

10.12. MARINE: RIVER ITCHEN SAC

10.12.1. OVERVIEW

10.12.1.1. The River Itchen SAC covers approximately 310 hectares of classic chalk river. It stretches from Swaithing in Southampton to New Alresford. The SAC does not overlap the Marine Cable Corridor and is 27.5 km distant at its closest point.

10.12.1.2. The site is designated for mainly freshwater riverine habitats and species however salmon which spend a large proportion of their adult life at sea are also listed as a qualifying species.

10.12.2. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES)

10.12.2.1. A site-specific Conservation Objectives and Supplementary Advice document is available for the River Itchen SAC[51]. Table 10.23 lists those attributes which are considered to be equivalent to those impacts for which an LSE could not be excluded.

Table 10.23 - Conservation and Supplementary Advice attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Salmon	Increased SSC	Population: Adult run size Population: Juvenile densities Supporting habitat: Biological connectivity Supporting processes: integrity of off-site habitats
	Pollution Events	Population: Adult run size Population: Juvenile densities Supporting habitat: Biological connectivity Supporting processes: integrity of off-site habitats

10.12.2.2. Non-equivalent attributes listed within the Conservation Objectives and Supplementary Advice document which are screened out from further assessment included:

- Population: spawning distribution;

[51] http://publications.naturalengland.org.uk/publication/5130124110331904 (Accessed: 15 October 2019)

- Supporting habitat: distribution of supporting habitat;
- Supporting habitat: Extent of supporting habitat;
- Supporting habitat: Biotope mosaic;
- Supporting habitat: flow regime;
- Supporting habitat: Riparian zone;
- Supporting habitat: sediment regime;
- Supporting habitat: soils, substrate and nutrient recycling;
- Supporting habitat: thermal regime;
- Supporting habitat: vegetation composition: invasive non-native species;
- Supporting habitat: water quality - acidification;
- Supporting habitat: water quality – nutrients;
- Supporting habitat: woody debris;
- Supporting processes: adaption and resilience;
- Supporting processes: air quality;
- Supporting processes: conservation measures;
- Supporting processes: control of livestock grazing activity;
- Supporting processes: fisheries – exploitation;
- Supporting processes: fisheries - introduction of fish species;
- Supporting processes: fisheries – introduction of salmon;
- Supporting processes: screening of intakes and discharges;
- Supporting processes: vegetation structure: cover of submerged macrophytes; and
- Supporting processes: water quantity/quality.

10.12.3. ASSESSMENT OF POTENTIAL ADVERSE EFFECTS ON SITE INTEGRITY

10.12.3.1. For those designated features where LSE could not be excluded, an assessment of potential adverse effects on site integrity is presented in Table 10.24 below.

10.12.3.2. It is concluded that there will be no adverse effects on site integrity for the River Itchen SAC, either from the Proposed Development alone, or in combination with other plans or projects.

Table 10.24 - Assessment of potential adverse effects on site integrity for the River Itchen SAC across all phases of the Proposed Development both alone and in combination with other plans and projects

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Salmon	The populations of qualifying species	Increased SSC	Population: Adult run size	Restore the population to that expected under un-impacted conditions, allowing for natural fluctuations. This should include a seasonal pattern of migration characteristic of the river and maintenance of the multi-sea winter component. Ensure that the stock exceeds its Conservation Limit in 4 out of 5 years The Conservation Limit indicates the minimum desirable adult spawning stock levels (expressed as annual number of eggs deposited) below which stocks should not be allowed to fall. Conservation limit for the River Itchen is considered to be 1.63 million eggs per year.	The potential impact of increased SSC relates to the sediment released as a result of the cable installation and associated works such as dredge and disposal activities, route clearance and rock placement for both the offshore and nearshore areas. The worst case for increased SSC in the offshore area (seaward of KP21) is considered to arise through deposit of dredge material which may be required for sandwave clearance, prior to cable installation. During dredge disposal, peak SSC of 1000 mgl^{-1} could arise within 1 km from the release point but coarser sediment is expected to fall out of suspension quickly (almost immediately) with significant reductions of SSC within hours of disposal at each location. Beyond 1 km from release, the passive plume which is transported beyond this is likely to generate SSC in the region of approximately 20 mgl^{-1}, transported in the direction of the prevailing flow out to a distance of c. 25km. SSC is predicted to reduce to background levels (<1 – 6 mg/l) within the timeframe of a few days following completion of disposal activities. The worst case for increased SSC in the nearshore area (landward of KP 21) is considered to be excavation at the HDD pits, and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations). The marine HDD exit/entry Landfall location is approx. 1 km off the coast of Eastney (KP 1 – KP 1.6) and will be excavated using a backhoe dredger or Mass Flow Excavator ('MFE'). The total volume to be excavated is up to 2,700 m^3. The finest sediments will potentially be transported up to 10 km in the nearshore area, however SSCs at these distances will be low (<5 mg/l) and therefore not discernible above natural variation, It is predicted that peak SSCs of up to 200 mg/l may be observed locally (i.e. within 2 km of the cable trench/HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench/pit at which point concentrations of 5 to 10 mg/l are predicted; SSC is expected to return to background levels within a few days following completion of these activities. SSCs can elicit a short and long-term response from aquatic biota depending on the quantity, quality and duration of the exposure. The greatest impact of suspended sediment on migratory fish is on incubating eggs and larval stages (Robertson *et al.*, 2007). This, in part, is due to their lack of mobility and inability to move away from the impact. Given that salmon spawn in freshwater there is no
			Population: Juvenile densities	Restore juvenile densities at those expected under unimpacted conditions throughout the site, taking into account natural habitat conditions and allowing for natural fluctuations	
	The structure and function of the habitats of qualifying species		Supporting habitat: Biological connectivity	The movement of characteristic biota should not be artificially constrained.	
			Supporting processes: integrity of off-site habitats	Habitats beyond the site boundary upon which characteristic biological communities of the site depend should be maintained in a state that does not impair the full expression of the characteristic biota within the site.	

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					route to impact on salmon eggs or larvae. Adult salmon exhibit strong swimming responses and are able to swim through or navigate around an impacted area e.g. areas of increased SSC. They are also inherently tolerant of naturally high and variable background levels of suspended sediment (Heard, 2007). This is also true for smolts as they develop in a riverine environment and are frequently exposed to increases in suspended sediment due to flood events and land run off. Therefore, it is concluded that there will be no adverse effects on site integrity from increased SSC on this feature from the Proposed Development alone. Considering the very small and localised effects predicted as a result of the Proposed Development, the general lack of sensitivity to the impact, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that will be no adverse effects on site integrity from in combination effects from increases in SSC.
	The populations of qualifying species	Pollution effects	Population: Adult run size	Restore the population to that expected under un-impacted conditions, allowing for natural fluctuations. This should include a seasonal pattern of migration characteristic of the river and maintenance of the multi-sea winter component. Ensure that the stock exceeds its Conservation Limit in 4 out of 5 years The Conservation Limit indicates the minimum desirable adult spawning stock levels (expressed as annual number of eggs deposited) below which stocks should not be allowed to fall. Conservation limit for the River Itchen is considered to be 1.63 million eggs per year.	Unplanned oil or chemical spillages from vessels may occur during all development phases. 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. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurring and therefore will not result in adverse effects on site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
			Population: Juvenile densities	Restore juvenile densities at those expected under unimpacted conditions throughout the site, taking into account natural habitat conditions and allowing for natural fluctuations	

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
	The structure and function of the habitats of qualifying species		Supporting habitat: Biological connectivity	The movement of characteristic biota should not be artificially constrained.	
			Supporting processes: integrity of off-site habitats	Habitats beyond the site boundary upon which characteristic biological communities of the site depend should be maintained in a state that does not impair the full expression of the characteristic biota within the site.	
Conclusion: No adverse effect on site integrity can be concluded for the River Itchen SAC, arising from either the Proposed Development alone, or in combination with other plans or projects.					

10.13. MARINE: RIVER AVON SAC

10.13.1. OVERVIEW

10.13.1.1. The River Avon SAC covers approximately 498 hectares and comprises the river and its tributaries. It includes sections running through chalk, greenand and clay (English Nature, 2005a). The SAC does not overlap the Marine Cable Corridor and is 51.4 km distant at its closest point.

10.13.1.2. The site is designated for mainly freshwater riverine habitats and species however salmon and sea lamprey which spend a large proportion of their adult life at sea are also listed as a qualifying species.

10.13.2. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES)

10.13.2.1. A site-specific Conservation Objectives and Supplementary Advice document is available for the River Avon SAC[52] Table 10.25 lists those attributes which are considered to be equivalent to those impacts for which an LSE could not be excluded.

Table 10.25 - Conservation and Supplementary Advice attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Salmon	Increased SSC	Population: Adult run size Population: Juvenile densities Supporting habitat: Biological connectivity Supporting processes: integrity of off-site habitats
	Pollution Events	Population: Adult run size Population: Juvenile densities Supporting habitat: Biological connectivity Supporting processes: integrity of off-site habitats
Sea lamprey	Increased SSC	Population: population abundance

[52] http://publications.naturalengland.org.uk/publication/6048472272732160 (Accessed 16 October 2019)

Feature	Impact for which LSE could not be excluded	Equivalent attribute
		Population: Juvenile densities Supporting habitat: Biological connectivity Supporting processes: integrity of off-site habitats
	Pollution Events	Population: population abundance Population: Juvenile densities Supporting habitat: Biological connectivity Supporting processes: integrity of off-site habitats

10.13.2.2. Non-equivalent attributes listed within the Conservation Objectives and Supplementary Advice document which are screened out from further assessment included:

- Population: spawning distribution;
- Supporting habitat: distribution of supporting habitat;
- Supporting habitat: extent of supporting habitat;
- Supporting habitat: biotope mosaic;
- Supporting habitat: flow regime;
- Supporting habitat: riparian zone;
- Supporting habitat: sediment regime;
- Supporting habitat: thermal regime;
- Supporting habitat: vegetation composition: invasive non-native species;
- Supporting habitat: water quality - acidification;
- Supporting habitat: water quality – organic pollution
- Supporting habitat: water quality – nutrients;
- Supporting habitat: woody debris;
- Supporting habitat: Introduction of fish species;

- Supporting processes: adaption and resilience;
- Supporting processes: air quality;
- Supporting processes: conservation measures;
- Supporting processes: control of livestock grazing activity;
- Supporting processes: fisheries – exploitation;
- Supporting processes: fisheries - introduction of salmon and/or other fish species;
- Supporting processes: screening of intakes and discharges; and
- Supporting processes: vegetation structure: cover of submerged macrophytes.

10.13.3. ASSESSMENT OF POTENTIAL ADVERSE EFFECTS ON SITE INTEGRITY

10.13.3.1. For those designated features where LSE could not be excluded, an assessment of potential adverse effects on site integrity is presented in Table 10.26 below.

10.13.3.2. It is concluded that there will be no adverse effects on site integrity for the River Avon SAC, either from the Proposed Development alone, or in combination with other plans or projects.

Table 10.26 - Assessment of potential adverse effects on site integrity for the River Avon SAC across all phases of the Proposed Development both alone and in combination with other plans and projects

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Sea lamprey	The populations of qualifying species	Increased SSC	Population: Population abundance	Maintain the abundance of the lamprey and bullhead populations at a level which is close to that expected under un-impacted conditions throughout the site (subject to natural habitat conditions and allowing for natural fluctuations), whilst avoiding deterioration from its current level as indicated by the latest count or equivalent.	The potential impact of increased SSC relates to the sediment released as a result of the cable installation and associated works such as dredge and disposal activities, route clearance and rock placement for both the offshore and nearshore areas. The worst case for increased SSC in the offshore area (seaward of KP21) is considered to arise through deposit of dredge material which may be required for sandwave clearance, prior to cable installation. During dredge disposal, peak SSC of 1000 mgl^{-1} could arise within 1 km from the release point but coarser sediment expected to fall out of suspension quickly (almost immediately) with significant reductions of SSC within hours of disposal at each location. Beyond 1 km from release, the passive plume which is transported beyond this is likely to generate SSC in the region of approximately 20 mgl^{-1}, transported in the direction of the prevailing flow out to a distance of c. 25km. SSC is predicted to reduce to background levels (<1 – 6 mg/l) within the timeframe of a few days following completion of disposal activities. The worst case for increased SSC in the nearshore area (landward of KP 21) is considered to be excavation at the HDD pits, and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations). The marine HDD exit/entry Landfall location is approx. 1 km off the coast of Eastney (KP 1 – KP 1.6) and will be excavated using a backhoe dredger or Mass Flow Excavator ('MFE'). The total volume to be excavated is up to 2,700 m^3. The finest sediments will potentially be transported up to 10 km in the nearshore area, however SSCs at these distances will be low (<5 mg/l) and therefore not discernible above natural variation, It is predicted that peak SSCs of up to 200 mg/l may be observed locally (i.e. within 2 km of the cable trench/HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench/pit at which point concentrations of 5 to 10 mg/l are predicted; SSC is expected to return to background levels within a few days following completion of these activities.
			Population: Juvenile densities	Restore juvenile densities at those expected under unimpacted conditions throughout the site, taking into account natural habitat conditions and allowing for natural fluctuations.	
	The structure and function of the habitats of qualifying species		Structure and Function: Biological connectivity	Restore the free movement of the typical species of the SAC feature through the site.	
			Structure and function: Supporting off-site habitat	Maintain habitats beyond the site boundary upon which characteristic biological communities of the SAC may depend	

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					Lamprey are considered to be less sensitive to suspended sediments than salmonids (Grabarkiewicz and Davis 2008). Although publicly available literature of the effects of suspended sediment on lamprey is limited sea lamprey are known to migrate through rivers and estuaries (both as adults and transformers) with very high SSC such as the Severn and the Humber which both naturally contain up to several thousand mg/l (FARL, 1995; Marshall and Elliot, 1998). Therefore, it is concluded that there will be no adverse effects on site integrity from increased SSC on this feature from the Proposed Development alone. Considering the indiscernibleeffects predicted as a result of the Proposed development, the general lack of sensitivity to the impact, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there will be no adverse effects on site integrity from in combination effects from increases in SSC.
	The populations of qualifying species	Pollution events	Population: Population abundance	Maintain the abundance of the lamprey and bullhead populations at a level which is close to that expected under un-impacted conditions throughout the site (subject to natural habitat conditions and allowing for natural fluctuations), whilst avoiding deterioration from its current level as indicated by the latest count or equivalent.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect both adult sea lamprey and transformers during their spawning or seaward migrations given their sensitivity to pollution. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
			Population: Juvenile densities	Restore juvenile densities at those expected under unimpacted conditions throughout the site, taking into account natural habitat conditions and allowing for natural fluctuations.	

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
	The structure and function of the habitats of qualifying species		Structure and Function: Biological connectivity	Restore the free movement of the typical species of the SAC feature through the site.	
			Structure and function: Supporting off-site habitat	Maintain habitats beyond the site boundary upon which characteristic biological communities of the SAC may depend	
Salmon	The populations of qualifying species		Population: Adult run size	Restore the population to that expected under un-impacted conditions, allowing for natural fluctuations. This should include a seasonal pattern of migration characteristic of the river and maintenance of the multi-seawinter component. As a minimum, the Conservation Limit for the river system should be complied with. As a minimum, the Conservation Limit for the river system should be complied with.	The potential impact of increased SSC relates to the sediment released as a result of the cable installation and associated works such as dredge and disposal activities, route clearance and rock placement for both the offshore and nearshore areas. The worst case for increased SSC in the offshore area (seaward of KP21) is considered to arise through deposit of dredge material which may be required for sandwave clearance, prior to cable installation. During dredge disposal, peak SSC of 1000 mgl^{-1} could arise within 1 km from the release point but coarser sediment expected to fall out of suspension quickly (almost immediately) with significant reductions of SSC within hours of disposal at each location. Beyond 1 km from release, the passive plume which is transported beyond this is likely to generate SSC in the region of approximately 20 mgl^{-1}, transported in the direction of the prevailing flow out to a distance of c. 25km. SSC is predicted to reduce to background levels (<1 – 6 mg/l) within the timeframe of a few days following completion of disposal activities. The worst case for increased SSC in the nearshore area (landward of KP 21) is considered to be excavation at the HDD pits, and cable installation (due to the potential for the liberation and dispersal of fines identified between KP 5 and 15, and in other isolated locations). The marine HDD exit/entry Landfall location is approx. 1 km off the coast of Eastney (KP 1 – KP 1.6) and will be excavated using a backhoe dredger or Mass Flow Excavator ('MFE'). The total volume to be excavated is up to 2,700 m^3. The finest sediments will potentially be transported up to 10 km in the
			Population: Juvenile densities	Restore juvenile densities at those expected under unimpacted conditions throughout the site, taking into account natural habitat conditions and allowing for natural fluctuations	

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
	The structure and function of the habitats of qualifying species		Supporting habitat: Biological connectivity	Restore the free movement of the typical species of the SAC feature through the site.	nearshore area, however SSCs at these distances will be low (<5 mg/l) and therefore not discernible above natural variation, It is predicted that peak SSCs of up to 200 mg/l may be observed locally (i.e. within 2 km of the cable trench/HDD pit) and these concentrations could potentially persist for several hours following completion of construction activities. Sediment plumes are also likely to be transported up to 5 km away from the trench/pit at which point concentrations of 5 to 10 mg/l are predicted; SSC is expected to return to background levels within a few days following completion of these activities. SSCs can elicit a short- and long-term response from aquatic biota depending on the quantity, quality and duration of the exposure. The greatest impact of suspended sediment on migratory fish is on incubating eggs and larval stages (Robertson *et al.*, 2007). This, in part, is due to their lack of mobility and inability to move away from the impact. Despite this increased sensitivity it was found that Pacific salmon (*Oncorhynchus*) and trout juveniles survived for 3-4 weeks in SSC of 300-750 mg/l (FARL, 1995). Given that salmon spawn in freshwater there is no route to impact on salmon eggs or larvae. Adult salmon on the other hand exhibit strong swimming responses and are able to swim through or navigate around an impacted area e.g. areas of increased SSC. They are also inherently tolerant of naturally high and variable background levels of suspended sediment (Heard, 2007). This is also true for smolts as they develop in a riverine environment and are frequently exposed to increases in suspended sediment due to flood events and land run off. Therefore, it is concluded that there will be no adverse effects on site integrity from increased SSC on this feature from the Proposed Development alone. Considering the indicernibleeffects predicted as a result of the Proposed Developments, the general lack of sensitivity to the impact, and the fact that all other activities which may result in in combination effects are likely to be similar or lesser in extent and magnitude, it is concluded that there are no adverse effects on site integrity from in combination increases in SSC.
			Structure and function: Supporting off-site habitat	Maintain habitats beyond the site boundary upon which characteristic biological communities of the SAC may depend	

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
	The populations of qualifying species	Pollution effects	Population: Adult run size	Restore the population to that expected under un-impacted conditions, allowing for natural fluctuations. This should include a seasonal pattern of migration characteristic of the river and maintenance of the multi-seawinter component. As a minimum, the Conservation Limit for the river system should be complied with. As a minimum, the Conservation Limit for the river system should be complied with.	Unplanned oil or chemical spillages from vessels may occur during all development phases. 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. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
			Population: Juvenile densities	Restore juvenile densities at those expected under unimpacted conditions throughout the site, taking into account natural habitat conditions and allowing for natural fluctuations	
	The structure and function of the habitats of qualifying species		Supporting habitat: Biological connectivity	Restore the free movement of the typical species of the SAC feature through the site.	
			Structure and function: Supporting off-site habitat	Maintain habitats beyond the site boundary upon which characteristic biological communities of the SAC may depend	

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Conclusion: No adverse effect on site integrity can be concluded for the River Avon SAC, arising from either the Proposed Development alone, or in combination with other plans or projects.					

10.14. MARINE: RIVER AXE SAC

10.14.1. OVERVIEW

10.14.1.1. The River Axe SAC covers approximately 25 hectares of river catchment. It has mixed geology of sandstones and limestones which gives rise to calcareous waters (English Nature, 2005b). The SAC does not overlap the Marine Cable Corridor and is 168 km distant at its closest point.

10.14.1.2. The site is designated for mainly freshwater riverine habitats and species however sea lamprey which spend a large proportion of their adult life at sea are also listed as a qualifying species.

10.14.2. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES)

10.14.2.1. A site-specific Conservation Objectives and Supplementary Advice document is available for the River Axe SAC[53]. Table 10.27 lists those attributes which are considered to be equivalent to those impacts for which an LSE could not be excluded.

Table 10.27 - Conservation and Supplementary Advice attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Sea lamprey	Pollution Events	Population: population abundance Population: Juvenile densities Supporting habitat: Biological connectivity Supporting habitat: integrity of off-site habitats

10.14.2.2. Non-equivalent attributes listed within the Conservation Objectives and Supplementary Advice document which are screened out from further assessment included:

- Supporting habitat: distribution of supporting habitat;
- Supporting habitat: Extent of supporting habitat;
- Supporting habitat: Biotope mosaic;
- Supporting habitat: flow regime;

[53] http://publications.naturalengland.org.uk/publication/5156988124135424 (Accessed: 16 October 2019)

- Supporting habitat: riparian zone;
- Supporting habitat: sediment regime;
- Supporting habitat: soils, substrate and nutrient cycling;
- Supporting habitat: vegetation composition: invasive non-native species;
- Supporting habitat: water quality - acidification;
- Supporting habitat: water quality – nutrients;
- Supporting habitat: woody debris;
- Supporting processes: adaption and resilience;
- Supporting processes: conservation measures;
- Supporting processes: control of livestock grazing activity;
- Supporting processes: fisheries – exploitation;
- Supporting processes: fisheries - introduction of fish species;
- Supporting processes: screening of intakes and discharges;
- Supporting processes: vegetation structure: cover of submerged macrophytes; and
- Supporting processes: water quantity/quality.

10.14.3. ASSESSMENT OF POTENTIAL ADVERSE EFFECTS ON SITE INTEGRITY

10.14.3.1. For those designated features where LSE could not be excluded, an assessment of potential adverse effects on site integrity is presented in Table 10.28 below.

10.14.3.2. It is concluded that there will be no adverse effects on site integrity for the River Axe SAC, either from the Proposed Development alone, or in combination with other plans or projects.

Table 10.28 - Assessment of potential adverse effects on site integrity for the River Axe SAC across all phases of the Proposed Development both alone and in combination with other plans and projects

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Sea lamprey	The populations of qualifying species	Pollution events	Population: Population abundance	Restore the abundance of the population to a level which is close to that expected under unimpacted conditions throughout the site (subject to natural habitat conditions and allowing for natural fluctuations), whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent. Petromyzon sp. Should reflect distribution under near-natural conditions.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect both adult sea lamprey and transformers during their spawning or seaward migrations given their sensitivity to pollution. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on Site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
			Population: Juvenile densities	Restore juvenile densities at those expected under unimpacted conditions throughout the site, taking into account natural habitat conditions and allowing for natural fluctuations.	
	The structure and function of the habitats of qualifying species		Structure and function: Biological connectivity	The movement of characteristic biota should not be artificially constrained.	
			Structure and function: Supporting off-site habitat	Habitats beyond the site boundary upon which characteristic biological communities of the site depend should be Restored in a state that does not impair the full expression of the characteristic biota within the site.	

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Conclusion: No adverse effect on site integrity can be concluded for the River Axe SAC, arising from either the Proposed Development alone, or in combination with other plans or projects.					

10.15. MARINE: PLYMOUTH SOUND AND ESTUARIES SAC

10.15.1. OVERVIEW

10.15.1.1. Plymouth Sound and Estuaries SAC is located on the south coast of the UK and covers approximately 6386 hectares of marine and coastal habitat and species. It has a range of features including estuaries, reefs and Atlantic salt meadows (JNCC, 2019). The SAC does not overlap the Marine Cable Corridor and is 225 km distant at its closest point.

10.15.1.2. Allis shad which spend a large proportion of their adult life at sea are also listed as a qualifying species.

10.15.2. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES)

10.15.2.1. A site-specific SACO is available for Plymouth Sound and Estuaries SAC[54]. Table 10.29 lists those attributes which are considered to be equivalent to those impacts for which an LSE could not be excluded.

Table 10.29 - Conservation and Supplementary Advice attributes screened in for assessment

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

10.15.2.2. Non-equivalent attributes listed within the Conservation Objectives and Supplementary Advice document which are screened out from further assessment included:

- Population: population size;
- Presence and spatial distribution of the species;
- Structure: Non-native species and pathogens;

54 https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK0013111&SiteName=plymouth&SiteNameDisplay=Plymouth+Sound+and+Estuaries+SAC&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4 (Accessed: 16 October 2019)

- Supporting habitat: extent and distribution;
- Supporting habitat: sediment regime;
- Supporting processes: fisheries – exploitation;
- Supporting processes: physico-chemical properties;
- Supporting processes: sediment movement and hydrodynamic regime;
- Supporting processes: water quality – DO;
- Supporting processes: water quality – nutrients; and
- Supporting processes: water quality – turbidity;

10.15.3. ASSESSMENT OF POTENTIAL ADVERSE EFFECTS ON SITE INTEGRITY

10.15.3.1. For those designated features where LSE could not be excluded, an assessment of potential adverse effects on site integrity is presented in Table 10.30 below.

10.15.3.2. It is concluded that there will be no adverse effects on site integrity for the Plymouth Sound and Estuaries SAC, either from the Proposed Development alone, or in combination with other plans or projects.

Table 10.30 - Assessment of potential adverse effects on site integrity for Plymouth Sound and Estuaries SAC across all phases of the Proposed Development both alone and in combination with other plans and projects

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Allis shad	The populations of qualifying species within the site	Pollution events	Population: recruitment and reproductive capability	Restore the reproductive and recruitment capability of the species.	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect allis shad during their spawning migration given their sensitivity to pollution and preference for surface waters. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
	The structure and function of the habitats of qualifying species		Structure and function: Biological connectivity	Restore connectivity of estuarine features to surrounding rivers, freshwater, marine and coastal habitats, to ensure larval dispersal and recruitment, maintain nursery grounds for mobile species, and to allow movement of migratory species.	
	The structure and function of the habitats of the qualifying species		Supporting habitat: food availability	Maintain the cover/abundance of preferred food items required by the species.	
	The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely		Supporting processes: water quality - contaminants	Reduce aqueous contaminants to levels equating to [High / Good] Status (according to Annex VIII and X of the WFD), avoiding deterioration from existing levels.	
Conclusion: No adverse effect on site integrity can be concluded for the Plymouth sound and estuaries SAC, arising from either the Proposed Development alone, or in combination with other plans or projects.					

10.16. MARINE: LITTORAL CAUCHOIS SAC

10.16.1. OVERVIEW

10.16.1.1. Littoral Cauchois SAC covers approximately 63 km^2 of the French coast from Le Treport to Le Havre. It is designated for both marine and terrestrial habitats and species (EEA, 2019a). The SAC does not overlap the Marine Cable Corridor and is 52.7 km distant at its closest point.

10.16.1.2. For migratory fish features, twaite shad, river lamprey and sea lamprey are qualifying features of this site.

10.16.1.3. For marine mammal features, bottlenose dolphin, harbour porpoise, grey seal and harbour seal are qualifying features of this site.

10.16.2. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES): ANNEX II DIADROMOUS MIGRATORY FISH SPECIES

10.16.2.1. Site-specific SACO is not available for the Littoral Cauchois SAC. As such, the Conservation Objectives and Supplementary Advice document for the River Wye SAC[55] which shares the same interest features will be used for the assessment. It should be noted that targets for the River Wye SAC will not be used for Littoral Cauchois SAC as these are site specific. Table 10.31 lists those attributes which are considered to be equivalent to those impacts for which an LSE could not be excluded.

Table 10.31 - Conservation and Supplementary Advice attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Twaite shad	Pollution Events	Population: adult run size Population: juvenile densities Supporting habitat: Biological connectivity Supporting processes: Integrity of off-site habitats
River lamprey	Pollution Events	Population: population abundance Population: Juvenile densities

[55] http://publications.naturalengland.org.uk/publication/6096799802589184 (Accessed: 17 October 2019)

Feature	Impact for which LSE could not be excluded	Equivalent attribute
		Supporting habitat: Biological connectivity Supporting habitats: Integrity of off-site habitats
Sea lamprey	Pollution Events	Population: population abundance Population: Juvenile densities Supporting habitat: Biological connectivity Supporting habitats: Integrity of off-site habitats

10.16.2.2. Non-equivalent attributes listed within the Conservation Objectives and Supplementary Advice document which are screened out from further assessment included:

- Population: spawning distribution;
- Supporting habitat: distribution of supporting habitat;
- Supporting habitat: Extent of supporting habitat;
- Supporting habitat: Biotope mosaic;
- Supporting habitat: flow regime;
- Supporting habitat: riparian zone;
- Supporting habitat: sediment regime;
- Supporting habitat: soils, substrate and nutrient cycling;
- Supporting habitat: vegetation composition: invasive non-native species;
- Supporting habitat: water quality - acidification;
- Supporting habitat: water quality – nutrients;
- Supporting habitat: woody debris;
- Supporting processes: air quality;
- Supporting processes: adaption and resilience;
- Supporting processes: conservation measures;

- Supporting processes: control of livestock grazing activity;
- Supporting processes: fisheries – exploitation;
- Supporting processes: fisheries - introduction of fish species;
- Supporting processes: fisheries – introduction of shad;
- Supporting habitat/processes: screening of intakes and discharges;
- Supporting processes: vegetation structure: cover of submerged macrophytes; and
- Supporting processes: water quantity/quality.

10.16.3. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES): MARINE MAMMAL SPECIES

10.16.3.1. Site-specific SACO is not currently available for this site. As such, the following information was used for each species:

- Bottlenose dolphin: Cardigan Bay SAC document[56];
- Harbour porpoise: Southern North Sea SAC Conservation Advice and Advice on Operations document[57];
- Grey seal: Pembrokeshire Marine SAC document[58] and the SACOs page of Natural England's Designated Sites View website for the Humber SAC[59]; and
- Harbour seal: SACOs page of Natural England's Designated Sites View website for The Wash and North Norfolk Coast SAC[60].

10.16.3.2. Table10.32 below lists those attributes considered to be equivalent to those impacts for which an LSE could not be excluded (pollution). No attributes were listed for either the proxy or other UK sites for either bottlenose dolphin or harbour porpoise.

Table 10.32 - SACO attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Bottlenose dolphin	Pollution	NA
Harbour porpoise	Pollution	NA

[56] https://cdn.naturalresources.wales/media/687993/eng-cardigan-bay-reg-37-report-2018.pdf?mode=pad&rnd=131929023330000000
[57] http://jncc.defra.gov.uk/pdf/SNorthSea_ConsAdvice.pdf
[58] https://cdn.naturalresources.wales/media/687999/eng-pembrokeshire-marine-reg-37-report-2018.pdf?mode=pad&rnd=131929024980000000
[59] https://designatedsites.naturalengland.org.uk/
[60] https://designatedsites.naturalengland.org.uk/

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Grey seal	Pollution	Supporting processes: water quality - contaminants
Harbour seal	Pollution	Supporting processes: water quality - contaminants

10.16.3.3. The following non-equivalent attributes listed within the SACOs were screened out from further assessment:

- Population: population size
- Population: recruitment and reproductive capability
- Presence and spatial distribution of the species
- Structure and function: biological connectivity
- Structure: Non-native species and pathogens
- Supporting habitat: extent and distribution
- Supporting habitat: food availability
- Supporting processes: physico-chemical properties
- Supporting processes: sediment movement and hydrodynamic regime
- Supporting processes: water quality – nutrients
- Supporting processes: water quality – turbidity

10.16.3.4. It should be noted that proxy targets have not been used because targets are site-specific.

10.16.4. ASSESSMENT OF POTENTIAL ADVERSE EFFECTS ON SITE INTEGRITY

10.16.4.1. For those designated features where LSE could not be excluded, an assessment of potential adverse effects on site integrity is presented in Table 10.33 and 10.34 below.

10.16.4.2. It is concluded that there will be no adverse effects on site integrity for Littoral Cauchois SAC, either from the Proposed Development alone, or in combination with other plans or projects.

Table 10.33 - Assessment of potential adverse effects on site integrity for Annex II fish species of the Littoral Cauchois SAC across all phases of the Proposed Development both alone and in combination with other plans and projects

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Twaite shad	The populations of qualifying species	Pollution events	Population: adult run size	N/A	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect twaite shad during their spawning migration given their sensitivity to pollution. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will preventthese events occurring and therefore will not result in adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
			Population: juvenile densities	N/A	
	The structure and function of the habitats of qualifying species		Supporting habitat: Biological connectivity	N/A	
	The supporting processes on which qualifying natural habitat and habitats of qualifying species rely		Supporting processes: Integrity of off-site habitats	N/A	
River lamprey	The populations of qualifying species	Pollution events	Population: population abundance	N/A	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect both adult river lamprey and transformers during their spawning or seaward migrations given their sensitivity to pollution. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on site integrity. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
	Population: Juvenile densities		Population: Juvenile densities	N/A	
	The structure and function of the habitats of qualifying species		Supporting habitat: Biological connectivity	N/A	
			Supporting habitats: Integrity of off-site habitats	N/A	
Sea lamprey	The populations of qualifying species	Pollution events	Population: Population abundance	N/A	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect both adult sea lamprey and transformers during their spawning or seaward migrations given their sensitivity to pollution. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it
			Population: Juvenile densities	N/A	
	The structure and function of the habitats of qualifying species		Supporting habitat: Biological connectivity	N/A	

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
			Structure and function: Supporting off-site habitat	N/A	is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
Conclusion: No adverse effect on site integrity can be concluded for the Littoral Cauchois SAC, arising from either the Proposed Development alone, or in combination with other plans or projects.					

Table 10.34 - Assessment of potential adverse effects on site integrity for marine mammal species in the Littoral Cauchois SAC across all phases of the Proposed Development both alone and in combination with other plans or projects

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Bottlenose dolphin	Maintain or restore: • The extent and distribution of qualifying natural habitats and habitats of the qualifying species; • The structure and function (including typical species) of qualifying natural habitats; • The structure and function of the habitats of the qualifying species; • The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; • The populations of each of the qualifying species; and • The distribution of qualifying species within the site.	Pollution	NA	NA	Mitigation included in the dML requires that the best practice plans and procedures for preventing pollution events are followed during delivery of the Proposed Development (see section 10.2.5). In the unlikely event of pollution events occurring, the same mitigation outlines procedures and responsibilities for effectively managing any events. Similar best practice measures are employed for the other plans and projects identified which could contribute to in combination effects. Therefore, it is concluded that adhering to mitigation measures will ensure that there will be no adverse effects on site integrity, either alone or in combination with other plans or projects.
Harbour porpoise		Pollution	NA	NA	
Grey seal		Pollution	Supporting processes: water quality - contaminants	NA	
Harbour seal		Pollution	Supporting processes: water quality - contaminants	NA	
Conclusion: No adverse effect on site integrity can be concluded for the Littoral Cauchois ZSC, arising from either the Proposed Development alone, or in combination with other plans or projects.					

10.17. MARINE: ESTUAIRES ET LITTORAL PICARDS (BAIES DE SOMME ET D'AUTHIE) SAC/ BAIE DE SOMME RAMSAR

10.17.1. OVERVIEW

10.17.1.1. Estuaires et Littoral Picards (Baies de Somme et d'Authie) SAC/Baie De Somme Ramsar covers approximately 15,646 ha of the French coast from Mers les Bains to Baie de l'Authie. It is designated for both marine and terrestrial habitats and species (EEA, 2019b). The SAC does not overlap the UK Marine Cable Corridor and is 84.6 km distant at its closest point.

10.17.1.2. River lamprey is qualifying feature of the SAC for Annex II diadromous fish species.

10.17.1.3. For marine mammal species, bottlenose dolphin, harbour porpoise, grey seal and harbour seal are qualifying features of the Estuaires et littoral picards (baies de Somme et d'Authie) SAC/Baie de Somme Ramsar.

10.17.2. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES): ANNEX II DIADROMOUS MIGRATORY FISH SPECIES

10.17.2.1. Site-specific SACO is not available for the Estuaires et Littoral Picards (Baies de Somme et d'Authie) SAC. As such, the Conservation Objectives and Supplementary Advice document for the River Wye SAC[61] which shares the same interest feature will be used for the assessment. It should be noted that targets for the River Wye SAC will not be used for Estuaires et Littoral Picards (Baies de Somme et d'Authie) SAC as these are site specific. Table 10.35 lists those attributes which are considered to be equivalent to those impacts for which an LSE could not be excluded.

Table 10.35 - Conservation and Supplementary Advice attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent attribute
River lamprey	Pollution Events	Population: population abundance Population: Juvenile densities Supporting habitat: Biological connectivity Supporting habitats: Integrity of off-site habitats

[61] http://publications.naturalengland.org.uk/publication/6096799802589184 (Accessed: 17 October 2019)

10.17.2.2. Non-equivalent attributes listed within the Conservation Objectives and Supplementary Advice document which are screened out from further assessment included:

- Supporting habitat: distribution of supporting habitat;
- Supporting habitat: Extent of supporting habitat;
- Supporting habitat: Biotope mosaic;
- Supporting habitat: flow regime;
- Supporting habitat: riparian zone;
- Supporting habitat: sediment regime;
- Supporting habitat: soils, substrate and nutrient cycling;
- Supporting habitat: vegetation composition: invasive non-native species;
- Supporting habitat: water quality - acidification;
- Supporting habitat: water quality – nutrients;
- Supporting habitat: woody debris;
- Supporting processes: adaption and resilience;
- Supporting processes: conservation measures;
- Supporting processes: control of livestock grazing activity;
- Supporting processes: fisheries – exploitation;
- Supporting processes: fisheries - introduction of fish species;
- Supporting processes: screening of intakes and discharges;
- Supporting processes: vegetation structure: cover of submerged macrophytes; and
- Supporting processes: water quantity/quality.

10.17.3. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES): MARINE MAMMAL SPECIES

10.17.3.1. Site-specific SACO is not currently available for this site. As such, the following information was used for each species:

- Bottlenose dolphin: Cardigan Bay SAC document[62];

[62] https://cdn.naturalresources.wales/media/687993/eng-cardigan-bay-reg-37-report-2018.pdf?mode=pad&rnd=131929023330000000

- Harbour porpoise: Southern North Sea SAC Conservation Advice and Advice on Operations document[63];
- Grey seal: Pembrokeshire Marine SAC document[64] and the SACOs page of Natural England's Designated Sites View website for the Humber SAC[65]; and
- Harbour seal: SACOs page of Natural England's Designated Sites View website for The Wash and North Norfolk Coast SAC[66].

10.17.3.2. Table 10.36 below lists those attributes considered to be equivalent to those impacts for which an LSE could not be excluded (i.e. pollution). No attributes were listed for either the proxy or other UK sites for either bottlenose dolphin or harbour porpoise.

Table 10.36 - SACO attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent Attribute
Bottlenose dolphin	Pollution	NA
Harbour porpoise	Pollution	NA
Grey seal	Pollution	Supporting processes: water quality - contaminants
Harbour seal	Pollution	Supporting processes: water quality - contaminants

10.17.3.3. The following non-equivalent attributes listed within the SACOs were screened out from further assessment:

- Population: population size
- Population: recruitment and reproductive capability
- Presence and spatial distribution of the species
- Structure and function: biological connectivity
- Structure: non-native species and pathogens
- Supporting habitat: extent and distribution

63 http://jncc.defra.gov.uk/pdf/SNorthSea_ConsAdvice.pdf
64 https://cdn.naturalresources.wales/media/687999/eng-pembrokeshire-marine-reg-37-report-2018.pdf?mode=pad&rnd=131929024980000000
65 https://designatedsites.naturalengland.org.uk/
66 https://designatedsites.naturalengland.org.uk/

- Supporting habitat: food availability
- Supporting processes: physico-chemical properties
- Supporting processes: sediment movement and hydrodynamic regime
- Supporting processes: water quality – nutrients
- Supporting processes: water quality – turbidity

10.17.4. ASSESSMENT OF POTENTIAL ADVERSE EFFECTS ON SITE INTEGRITY

10.17.4.1. For those designated features where LSE could not be excluded, an assessment of potential adverse effects on site integrity is presented in Table 10.37 and Table 10.38 below.

10.17.4.2. It is concluded that there will be no adverse effects on site integrity for Estuaires et Littoral Picards (Baies de Somme et d'Authie) SAC/Baie de Somme Ramsar, either from the Proposed Development alone, or in combination with other plans or projects

Table 10.37 - Assessment of potential adverse effects on site integrity for Estuaires et Littoral Picards (Baies de Somme et d'Authie) SAC across all phases of the Proposed Development both alone and in combination with other plans and projects

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
River lamprey	The populations of qualifying species	Pollution events	Population: population abundance	N/A	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect both adult river lamprey and transformers during their spawning or seaward migrations given their sensitivity to pollution. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
	Population: Juvenile densities		Population: Juvenile densities	N/A	
	The structure and function of the habitats of qualifying species		Supporting habitat: Biological connectivity	N/A	
			Supporting habitats: Integrity of off-site habitats	N/A	
Conclusion: No adverse effect on site integrity can be concluded for the Estuaires et Littoral Picards (Baies de Somme et d'Authie) SAC arising from either the Proposed Development alone, or in combination with other plans or projects.					

Table 10.38 - Assessment of potential adverse effects on site integrity for the Estuaires et littoral picards (baies de Somme et d'Authie) SAC/Baie de Somme Ramsar across all phases of the Proposed Development both alone and in combination with other plans or projects

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Bottlenose dolphin	Maintain or restore: The extent and distribution of qualifying natural habitats and habitats of the qualifying species; The structure and function (including typical species) of qualifying natural habitats; The structure and function of the habitats of the qualifying species; The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;	Pollution	NA	NA	Mitigation included in the dML requires that the best practice plans and procedures for preventing pollution events are followed during delivery of the Proposed Development (see section 10.2.5). In the unlikely event of pollution events occurring, the same mitigation outlines procedures and responsibilities for effectively managing any events. Similar best practice measures are employed for the other plans and projects identified which could contribute to in combination effects. Therefore, it is concluded that adhering to mitigation measures will ensure that there will be no adverse effects on site integrity, either alone or in combination with other plans and projects
Harbour porpoise		Pollution	NA	NA	
Grey seal		Pollution	Supporting processes: water quality - contaminants	NA	
Harbour seal		Pollution	Supporting processes: water quality - contaminants	NA	

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
	The populations of each of the qualifying species; and The distribution of qualifying species within the site.				
Conclusion: No adverse effect on site integrity can be concluded for the Estuaires et Littoral Picards (Baies de Somme et d'Authie) SAC/Baie de Somme Ramsar arising from either the Proposed Development alone, or in combination with other plans or projects.					

10.18. MARINE: BAIE DE CANCHE ET COULOIR DES TROIS ESTUAIRES SAC

10.18.1. OVERVIEW

10.18.1.1. Baie de Canche et Couloir des trois Estuaires SAC covers approximately 33,306 ha of the French coast from Ault to Camiers. It is designated for both marine and estuarine habitat and species (EEA, 2019c). The SAC does not overlap the Marine Cable Corridor and is 86.5 km distant at its closest point.

10.18.1.2. Salmon, allis shad, river lamprey, and sea lamprey are Annex II fish qualifying features of this site.

10.18.1.3. Harbour porpoise, grey seal and harbour seal are marine mammal qualifying features of the site

10.18.2. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES): ANNEX II DIADROMOUS MIGRATORY FISH SPECIES

10.18.2.1. Site-specific SACO is not available for the Baie de Canche et Couloir des trois Estuaires SAC. As such, the Conservation Objectives and Supplementary Advice document for the River Wye SAC[67] which shares the same interest features will be used for the assessment. It should be noted that targets for the River Wye SAC will not be used for Baie de Canche et Couloir des trois Estuaires SAC as these are site specific. Table 10.39 lists those attributes which are considered to be equivalent to those impacts for which an LSE could not be excluded.

Table 10.39 - Conservation and Supplementary Advice attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Salmon	Pollution Events	Population: adult run size Population: juvenile densities Supporting habitat: biological connectivity Supporting processes: integrity of off-site habitats
Allis shad	Pollution Events	Population: adult run size Population: juvenile densities Supporting habitat: Biological connectivity Supporting processes: Integrity of off-site habitats

[67] http://publications.naturalengland.org.uk/publication/6096799802589184 (Accessed: 17 October 2019)

Feature	Impact for which LSE could not be excluded	Equivalent attribute
River lamprey	Pollution Events	Population: population abundance Population: Juvenile densities Supporting habitat: Biological connectivity Supporting habitats: Integrity of off-site habitats
Sea lamprey	Pollution Events	Population: population abundance Population: Juvenile densities Supporting habitat: Biological connectivity Supporting habitats: Integrity of off-site habitats

10.18.2.2. Non-equivalent attributes listed within the Conservation Objectives and Supplementary Advice document which are screened out from further assessment included:

- Population: spawning distribution;
- Supporting habitat: distribution of supporting habitat;
- Supporting habitat: Extent of supporting habitat;
- Supporting habitat: Biotope mosaic;
- Supporting habitat: flow regime;
- Supporting habitat: riparian zone;
- Supporting habitat: sediment regime;
- Supporting habitat: soils, substrate and nutrient cycling;
- Supporting habitat: vegetation composition: invasive non-native species;
- Supporting habitat: water quality - acidification;
- Supporting habitat: water quality – nutrients;
- Supporting habitat: woody debris;
- Supporting processes: adaption and resilience;
- Supporting processes: conservation measures;
- Supporting processes: control of livestock grazing activity;

- Supporting processes: fisheries – exploitation;
- Supporting processes: fisheries - introduction of fish species;
- Supporting processes: fisheries - introduction of salmon;
- Supporting processes: screening of intakes and discharges;
- Supporting processes: air quality;
- Supporting processes: vegetation structure: cover of submerged macrophytes; and
- Supporting processes: water quantity/quality.

10.18.3. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES): MARINE MAMMAL SPECIES

10.18.3.1. Site-specific SACO is not currently available for this site. As such, the following information was used for each species:

- Harbour porpoise: Southern North Sea SAC Conservation Advice and Advice on Operations document[68];
- Grey seal: Pembrokeshire Marine SAC document[69] and the SACOs page of Natural England's Designated Sites View website for the Humber SAC[70]; and
- Harbour seal: SACOs page of Natural England's Designated Sites View website for The Wash and North Norfolk Coast SAC[71].

10.18.3.2. Table 10.40 below lists those attributes considered to be equivalent to those impacts for which an LSE could not be excluded (pollution). No attributes were listed for either the proxy or other UK sites for harbour porpoise.

Table 10.40 - SACO attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Harbour porpoise	Pollution	NA
Grey seal	Pollution	Supporting processes: water quality - contaminants

68 http://jncc.defra.gov.uk/pdf/SNorthSea_ConsAdvice.pdf
69 https://cdn.naturalresources.wales/media/687999/eng-pembrokeshire-marine-reg-37-report-2018.pdf?mode=pad&rnd=131929024980000000
70 https://designatedsites.naturalengland.org.uk/
71 https://designatedsites.naturalengland.org.uk/

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Harbour seal	Pollution	Supporting processes: water quality - contaminants

10.18.3.3. The following non-related attributes listed within the SACOs were screened out from further assessment:

- Population: population size
- Population: recruitment and reproductive capability
- Presence and spatial distribution of the species
- Structure and function: biological connectivity
- Structure: Non-native species and pathogens
- Supporting habitat: extent and distribution
- Supporting habitat: food availability
- Supporting processes: physico-chemical properties
- Supporting processes: sediment movement and hydrodynamic regime
- Supporting processes: water quality – nutrients
- Supporting processes: water quality – turbidity

10.18.4. ASSESSMENT OF POTENTIAL ADVERSE EFFECTS ON SITE INTEGRITY

10.18.4.1. For those designated features where LSE could not be excluded, an assessment of potential adverse effects on site integrity is presented in Table 10.41 and Table 10.42 below.

10.18.4.2. It is concluded that there will be no adverse effects on site integrity for Baie de Canche et Couloir des trois Estuaires SAC, either from the Proposed Development alone, or in combination with other plans or projects.

Table 10.41 - Assessment of potential adverse effects on site integrity for Baie de Canche et Couloir des trois Estuaires SAC across all phases of the Proposed Development both alone and in combination with other plans and projects

Feature	Conservation Objectives	Effects	Attribute	Target	Assessment
Salmon	The populations of qualifying species	Pollution events	Population: adult run size	N/A	Unplanned oil or chemical spillages from vessels may occur during all development phases. 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. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringtherefore will not result in adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
			Population: juvenile densities	N/A	
	The structure and function of the habitats of qualifying species		Supporting habitat: biological connectivity	N/A	
	The supporting processes on which qualifying natural habitat and habitats of qualifying species rely		Supporting processes: integrity of off-site habitats	N/A	
Allis shad	The populations of qualifying species	Pollution events	Population: adult run size	N/A	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect allis shad during their spawning migrations given their sensitivity to pollution. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
			Population: juvenile densities	N/A	
	The structure and function of the habitats of qualifying species		Supporting habitat: Biological connectivity	N/A	
	The supporting processes on which qualifying natural habitat and habitats of qualifying species rely		Supporting processes: Integrity of off-site habitats	N/A	
River lamprey	The populations of qualifying species	Pollution events	Population: population abundance	N/A	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect both adult

Feature	Conservation Objectives	Effects	Attribute	Target	Assessment
					river lamprey and transformers during their spawning or seaward migrations given their sensitivity to pollution. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringtherefore will not result in adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
	Population: Juvenile densities		Population: Juvenile densities	N/A	
	The structure and function of the habitats of qualifying species		Supporting habitat: Biological connectivity	N/A	
			Supporting habitats: Integrity of off-site habitats	N/A	
Sea lamprey	The populations of qualifying species	Pollution events	Population: Population abundance	N/A	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect both adult sea lamprey and transformers during their spawning migrations given their sensitivity to pollution. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
			Population: Juvenile densities	N/A	
	The structure and function of the habitats of qualifying species		Supporting habitat: Biological connectivity	N/A	
			Structure and function: Supporting off-site habitat	N/A	
Conclusion: No adverse effect on site integrity can be concluded for the Baie de Canche et couloir des trois estuaires SAC arising from either the Proposed Development alone, or in combination with other plans or projects.					

Table 10.42 - Assessment of potential adverse effects on site integrity for the Baie de Canche et couloir des trois estuaires SAC across all phases of the Proposed Development both alone and in combination with other plans or projects

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Harbour porpoise	Maintain or restore: The extent and distribution of qualifying natural habitats and habitats of the qualifying species; The structure and function (including typical species) of qualifying natural habitats; The structure and function of the habitats of the qualifying species; The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; The populations of each of the qualifying species; and The distribution of qualifying species within the site.	Pollution	NA	NA	Mitigation included in the dML requires that the best practice plans and procedures for preventing pollution events are followed during delivery of the Proposed Development (see section 10.2.5). In the unlikely event of pollution events occurring, the same mitigation outlines procedures and responsibilities for effectively managing any events. Similar best practice measures are employed for the other plans and projects identified which could contribute to in combination effects. Therefore, it is concluded that adhering to mitigation measures will ensure that there will be no adverse effects on site integrity, either alone or in combination.
Grey seal		Pollution	Supporting processes: water quality - contaminants	NA	
Harbour seal		Pollution	Supporting processes: water quality - contaminants	NA	
Conclusion: No adverse effect on site integrity can be concluded for the Baie de Canche et couloir des trois estuaires SAC arising from either the Proposed Development alone, or in combination with other plans or projects.					

10.19. MARINE: BAIE DE SEINE ORIENTALE SAC

10.19.1. OVERVIEW

10.19.1.1. Baie de Seine Orientale SAC covers approximately 44,402 ha of the French marine area off the coast of Ouistreham. It is designated for both marine habitats and species (EEA, 2019d). The SAC does not overlap the Marine Cable Corridor and is 90.9 km distant at its closest point.

10.19.1.2. Twaite shad, salmon, allis shad, river lamprey, and sea lamprey are Annex II fish qualifying features of this site.

10.19.1.3. Bottlenose dolphin, harbour porpoise, grey seal and harbour seal are marine mammal qualifying features of the site

10.19.2. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES): ANNEX II MIGRATORY DIADROMOUS FISH SPECIES

10.19.2.1. Site-specific SACO is not available for the Baie de Seine Orientale SAC. As such, the Conservation Objectives and Supplementary Advice document for the River Wye SAC[72] which shares the same interest features will be used for the assessment. It should be noted that targets for the River Wye SAC will not be used for Baie de Seine Orientale SAC as these are site specific. Table 10.43 lists those attributes which are considered to be equivalent to those impacts for which an LSE could not be excluded.

Table 10.43 - Conservation and Supplementary Advice attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Twaite shad	Pollution Events	Population: adult run size Population: juvenile densities Supporting habitat: Biological connectivity Supporting processes: Integrity of off-site habitats
Salmon	Pollution Events	Population: adult run size Population: juvenile densities Supporting habitat: biological connectivity

[72] http://publications.naturalengland.org.uk/publication/6096799802589184 (Accessed: 17 October 2019)

Feature	Impact for which LSE could not be excluded	Equivalent attribute
		Supporting processes: integrity of off-site habitats
Allis shad	Pollution Events	Population: adult run size Population: juvenile densities Supporting habitat: Biological connectivity Supporting processes: Integrity of off-site habitats
River lamprey	Pollution Events	Population: population abundance Population: Juvenile densities Supporting habitat: Biological connectivity Supporting habitats: Integrity of off-site habitats
Sea lamprey	Pollution Events	Population: population abundance Population: Juvenile densities Supporting habitat: Biological connectivity Supporting habitats: Integrity of off-site habitats

10.19.2.2. Non-equivalent attributes listed within the Conservation Objectives and Supplementary Advice document which are screened out from further assessment included:

- Population: spawning distribution;
- Supporting habitat: distribution of supporting habitat;
- Supporting habitat: Extent of supporting habitat;

- Supporting habitat: Biotope mosaic;
- Supporting habitat: flow regime;
- Supporting habitat: riparian zone;
- Supporting habitat: sediment regime;
- Supporting habitat: soils, substrate and nutrient cycling;
- Supporting habitat: vegetation composition: invasive non-native species;
- Supporting habitat: water quality - acidification;
- Supporting habitat: water quality – nutrients;
- Supporting habitat: woody debris;
- Supporting processes: adaption and resilience;
- Supporting processes: conservation measures;
- Supporting processes: control of livestock grazing activity;
- Supporting processes: fisheries – exploitation;
- Supporting processes: fisheries - introduction of fish species;
- Supporting processes: fisheries - introduction of salmon;
- Supporting processes: screening of intakes and discharges;
- Supporting processes: air quality;
- Supporting processes: vegetation structure: cover of submerged macrophytes; and
- Supporting processes: water quantity/quality.

10.19.3. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES): MARINE MAMMAL SPECIES

10.19.3.1. Site-specific SACO is not currently available for this site. As such, the following information was used for each species:

- Bottlenose dolphin: Cardigan Bay SAC document[73];
- Harbour porpoise: Southern North Sea SAC Conservation Advice and Advice on Operations document[74];

[73] https://cdn.naturalresources.wales/media/687993/eng-cardigan-bay-reg-37-report-2018.pdf?mode=pad&rnd=131929023330000000
[74] http://jncc.defra.gov.uk/pdf/SNorthSea_ConsAdvice.pdf

- Grey seal: Pembrokeshire Marine SAC document[75] and the SACOs page of Natural England's Designated Sites View website for the Humber SAC[76]; and
- Harbour seal: SACOs page of Natural England's Designated Sites View website for The Wash and North Norfolk Coast SAC[77].

10.19.3.2. Table 10.44 below lists those attributes considered to be equivalent to those impacts for which an LSE could not be excluded (pollution). No attributes were listed for either the proxy or other UK sites for either bottlenose dolphin or harbour porpoise.

Table 10.44 - SACO attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Bottlenose dolphin	Pollution	NA
Harbour porpoise	Pollution	NA
Grey seal	Pollution	Supporting processes: water quality - contaminants
Harbour seal	Pollution	Supporting processes: water quality - contaminants

10.19.3.3. The following non-equivalent attributes listed within the SACOs were screened out from further assessment:

- Population: population size
- Population: recruitment and reproductive capability
- Presence and spatial distribution of the species
- Structure and function: biological connectivity
- Structure: Non-native species and pathogens
- Supporting habitat: extent and distribution
- Supporting habitat: food availability
- Supporting processes: physico-chemical properties
- Supporting processes: sediment movement and hydrodynamic regime

[75] https://cdn.naturalresources.wales/media/687999/eng-pembrokeshire-marine-reg-37-report-2018.pdf?mode=pad&rnd=131929024980000000
[76] https://designatedsites.naturalengland.org.uk/
[77] https://designatedsites.naturalengland.org.uk/

- Supporting processes: water quality – nutrients
- Supporting processes: water quality – turbidity

10.19.4. ASSESSMENT OF POTENTIAL ADVERSE EFFECTS ON SITE INTEGRITY

10.19.4.1. For those designated features where LSE could not be excluded, an assessment of potential adverse effects on site integrity is presented in Table 10.45 and Table 10.46 below.

10.19.4.2. It is concluded that there will be no adverse effects on site integrity for Baie de Seine Orientale SAC, either from the Proposed Development alone, or in combination with other plans or projects.

Table 10.45 - Assessment of potential adverse effects on site integrity for Annex II fish species of Baie de Seine Orientale SAC across all phases of the Proposed Development both alone and in combination with other plans and projects

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Twaite shad	The populations of qualifying species	Pollution events	Population: adult run size	N/A	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect twaite shad during their spawning migrations given their sensitivity to pollution. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
			Population: juvenile densities	N/A	
	The structure and function of the habitats of qualifying species		Supporting habitat: Biological connectivity	N/A	
	The supporting processes on which qualifying natural habitat and habitats of qualifying species rely		Supporting processes: Integrity of off-site habitats	N/A	
Salmon	The populations of qualifying species	Pollution events	Population: adult run size	N/A	Unplanned oil or chemical spillages from vessels may occur during all development phases. 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. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
			Population: juvenile densities	N/A	
	The structure and function of the habitats of qualifying species		Supporting habitat: biological connectivity	N/A	
	The supporting processes on which qualifying natural habitat and habitats of qualifying species rely		Supporting processes: integrity of off-site habitats	N/A	
Allis shad	The populations of qualifying species	Pollution events	Population: adult run size	N/A	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect allis shad during their spawning migrations given their sensitivity to pollution. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5)
			Population: juvenile densities	N/A	

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
	The structure and function of the habitats of qualifying species		Supporting habitat: Biological connectivity	N/A	and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
	The supporting processes on which qualifying natural habitat and habitats of qualifying species rely		Supporting processes: Integrity of off-site habitats	N/A	
River lamprey	The populations of qualifying species	Pollution events	Population: population abundance	N/A	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect both adult river lamprey and transformers during their spawning or seaward migrations given their sensitivity to pollution. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
	Population: Juvenile densities		Population: Juvenile densities	N/A	
	The structure and function of the habitats of qualifying species		Supporting habitat: Biological connectivity	N/A	
			Supporting habitats: Integrity of off-site habitats	N/A	
Sea lamprey	The populations of qualifying species	Pollution events	Population: Population abundance	N/A	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect both adult sea lamprey and transformers during their spawning or seaward migrations given their sensitivity to pollution. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no
			Population: Juvenile densities	N/A	
	The structure and function of the habitats of qualifying species		Supporting habitat: Biological connectivity	N/A	
			Structure and function: Supporting off-site habitat	N/A	

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
					adverse effect on site integrity in combination with other plans and projects.
Conclusion: No adverse effect on site integrity can be concluded for the Baie de Seine orientale SAC arising from either the Proposed Development alone, or in combination with other plans or projects.					

Table 10.46 - Assessment of potential adverse effects on site integrity for marine mammal features of the Baie de Seine orientale ZSC across all phases of the Proposed Development both alone and in combination with other plans or projects

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Bottlenose dolphin	Maintain or restore: The extent and distribution of qualifying natural habitats and habitats of the qualifying species; The structure and function (including typical species) of qualifying natural habitats; The structure and function of the habitats of the qualifying species; The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; The populations of each of the qualifying species; and The distribution of qualifying species within the site.	Pollution	NA	NA	Mitigation included in the dML requires that the best practice plans and procedures for preventing pollution events are followed during delivery of the Proposed Development (see section 10.2.5). In the unlikely event of pollution events occurring, the same mitigation outlines procedures and responsibilities for effectively managing any events. Similar best practice measures are employed for the other plans and projects identified which could contribute to in combination effects. Therefore, it is concluded that adhering to mitigation measures will ensure that there will be no adverse effects on site integrity, either alone or in combination with other plans or projects.
Harbour porpoise		Pollution	NA	NA	
Grey seal		Pollution	Supporting processes: water quality - contaminants	NA	
Harbour seal		Pollution	Supporting processes: water quality - contaminants	NA	
Conclusion: No adverse effect on site integrity can be concluded for the Baie de Seine orientale SAC arising from either the Proposed Development alone, or in combination with other plans or projects.					

10.20. MARINE: RIDENS ET DUNES HYDRAULIQUES DU DÉTROIT DU PAS-DE-CALAIS SAC

10.20.1. OVERVIEW

10.20.1.1. Harbour porpoise, grey seal and harbour seal are qualifying features of the Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC which is approximately 59 km from the Proposed Development at its closest point.

10.20.2. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES)

10.20.2.1. Site-specific SACO is not currently available for this site. As such, the following information was used for each species:

- Harbour porpoise: Southern North Sea SAC Conservation Advice and Advice on Operations document[78];
- Grey seal: Pembrokeshire Marine SAC document[79] and the SACOs page of Natural England's Designated Sites View website for the Humber SAC[80]; and
- Harbour seal: SACOs page of Natural England's Designated Sites View website for The Wash and North Norfolk Coast SAC[81].

10.20.2.2. Table 10.47 below lists those attributes considered to be equivalent to those impacts for which an LSE could not be excluded (pollution). No attributes were listed for either the proxy or other UK sites for harbour porpoise.

Table 10.47 - SACO attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Harbour porpoise	Pollution	NA
Grey seal	Pollution	Supporting processes: water quality - contaminants
Harbour seal	Pollution	Supporting processes: water quality - contaminants

[78] http://jncc.defra.gov.uk/pdf/SNorthSea_ConsAdvice.pdf
[79] https://cdn.naturalresources.wales/media/687999/eng-pembrokeshire-marine-reg-37-report-2018.pdf?mode=pad&rnd=131929024980000000
[80] https://designatedsites.naturalengland.org.uk/
[81] https://designatedsites.naturalengland.org.uk/

10.20.2.3. The following non-equivalent attributes listed within the SACOs were screened out from further assessment:

- Population: population size
- Population: recruitment and reproductive capability
- Presence and spatial distribution of the species
- Structure and function: biological connectivity
- Structure: Non-native species and pathogens
- Supporting habitat: extent and distribution
- Supporting habitat: food availability
- Supporting processes: physico-chemical properties
- Supporting processes: sediment movement and hydrodynamic regime
- Supporting processes: water quality – nutrients
- Supporting processes: water quality – turbidity

10.20.3. ASSESSMENT OF POTENTIAL ADVERSE EFFECTS ON SITE INTEGRITY

10.20.3.1. For those designated features where LSE could not be excluded, an assessment of potential adverse effects on site integrity is presented in Table 10.48 below.

10.20.3.2. It should be noted that proxy targets have not been used because targets are site-specific.

10.20.3.3. It is concluded that there will be no adverse effects on site integrity for the Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC from either the Proposed Development alone or the Proposed Development in combination with other plans or projects.

Table 10.48 - Assessment of potential adverse effects on site integrity for the Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC across all phases of the Proposed Development both alone and in combination with other plans or projects

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Harbour porpoise	Maintain or restore: The extent and distribution of qualifying natural habitats and habitats of the qualifying species; The structure and function (including typical species) of qualifying natural habitats; The structure and function of the habitats of the qualifying species; The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; The populations of each of the qualifying species; and The distribution of qualifying species within the site.	Pollution	NA	NA	Mitigation included in the dML requires that the best practice plans and procedures for preventing pollution events are followed during delivery of the Proposed Development (see section 10.2.5). In the unlikely event of pollution events occurring, the same mitigation outlines procedures and responsibilities for effectively managing any events. Similar best practice measures are employed for the other plans and projects identified which could contribute to in combination effects. Therefore, it is concluded that adhering to mitigation measures will ensure that there will be no adverse effects on site integrity, either alone or in combination with other plans or projects.
Grey seal		Pollution	Supporting processes: water quality - contaminants	NA	
Harbour seal		Pollution	Supporting processes: water quality - contaminants	NA	
Conclusion: No adverse effect on site integrity can be concluded for the Ridens et dunes hydrauliques du détroit du Pas-de-Calais SAC arising from either the Proposed Development alone, or in combination with other plans or projects.					

10.21. MARINE: ESTUAIRE DE LA SEINE SAC/MARAIS VERNIER RAMSAR

10.21.1. OVERVIEW

10.21.1.1. Estuaire de la Seine SAC/Marais Vernier Ramsar does not overlap the Marine Cable Corridor and is approximately 90 km from the Proposed Development.

10.21.1.2. Twaite shad, salmon, river lamprey, and sea lamprey are Annex II fish qualifying features of this site. Harbour porpoise, grey seal and harbour seal are qualifying features of the SAC but not the Ramsar.

10.21.2. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES): ANNEX II MIGRATORY DIADROMOUS FISH SPECIES

10.21.2.1. Site-specific SACO is not available for the Estuaire de la Seine SAC / Marais Vernier Ramsar. As such, the Conservation Objectives and Supplementary Advice document for the River Wye SAC[82] which shares the same interest features will be used for the assessment. It should be noted that targets for the River Wye SAC will not be used for Estuaire de la Seine SAC as these are site specific. Table 10.49 lists those attributes which are considered to be equivalent to those impacts for which an LSE could not be excluded.

Table 10.49 - Conservation and Supplementary Advice attributes screened in for assessment.

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Twaite shad	Pollution Events	Population: adult run size Population: juvenile densities Supporting habitat: Biological connectivity Supporting processes: Integrity of off-site habitats
Salmon	Pollution Events	Population: adult run size Population: juvenile densities Supporting habitat: biological connectivity

[82] http://publications.naturalengland.org.uk/publication/6096799802589184 (Accessed: 17 October 2019)

Feature	Impact for which LSE could not be excluded	Equivalent attribute
		Supporting processes: integrity of off-site habitats
River lamprey	Pollution Events	Population: population abundance Population: Juvenile densities Supporting habitat: Biological connectivity Supporting habitats: Integrity of off-site habitats
Sea lamprey	Pollution Events	Population: population abundance Population: Juvenile densities Supporting habitat: Biological connectivity Supporting habitats: Integrity of off-site habitats

10.21.2.2. Non-equivalent attributes listed within the Conservation Objectives and Supplementary Advice document which are screened out from further assessment included:

- Population: spawning distribution;
- Supporting habitat: distribution of supporting habitat;
- Supporting habitat: Extent of supporting habitat;
- Supporting habitat: Biotope mosaic;
- Supporting habitat: flow regime;
- Supporting habitat: riparian zone;
- Supporting habitat: sediment regime;
- Supporting habitat: soils, substrate and nutrient cycling;
- Supporting habitat: vegetation composition: invasive non-native species;
- Supporting habitat: water quality - acidification;

- Supporting habitat: water quality – nutrients;
- Supporting habitat: woody debris;
- Supporting processes: adaption and resilience;
- Supporting processes: conservation measures;
- Supporting processes: control of livestock grazing activity;
- Supporting processes: fisheries – exploitation;
- Supporting processes: fisheries - introduction of fish species;
- Supporting processes: fisheries - introduction of salmon;
- Supporting processes: screening of intakes and discharges;
- Supporting processes: air quality;
- Supporting processes: vegetation structure: cover of submerged macrophytes; and
- Supporting processes: water quantity/quality.

10.21.3. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES): MARINE MAMMAL SPECIES

10.21.3.1. Site-specific SACO is not currently available for this site. As such, the following information was used for each species:

- Harbour porpoise: Southern North Sea SAC Conservation Advice and Advice on Operations document[83];
- Grey seal: Pembrokeshire Marine SAC document[84] and the SACOs page of Natural England's Designated Sites View website for the Humber SAC[85]; and
- Harbour seal: SACOs page of Natural England's Designated Sites View website for The Wash and North Norfolk Coast SAC[86].

10.21.3.2. Table 10.50 below lists those attributes considered to be equivalent to those impacts for which an LSE could not be excluded (pollution). No attributes were listed for either the proxy or other UK sites for harbour porpoise.

[83] http://jncc.defra.gov.uk/pdf/SNorthSea_ConsAdvice.pdf
[84] https://cdn.naturalresources.wales/media/687999/eng-pembrokeshire-marine-reg-37-report-2018.pdf?mode=pad&rnd=131929024980000000
[85] https://designatedsites.naturalengland.org.uk/
[86] https://designatedsites.naturalengland.org.uk/

Table 10.50 - SACO attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Harbour porpoise	Pollution	NA
Grey seal	Pollution	Supporting processes: water quality - contaminants
Harbour seal	Pollution	Supporting processes: water quality - contaminants

10.21.3.3. The following non-equivalent attributes listed within the SACOs were screened out from further assessment:

- Population: population size
- Population: recruitment and reproductive capability
- Presence and spatial distribution of the species
- Structure and function: biological connectivity
- Structure: Non-native species and pathogens
- Supporting habitat: extent and distribution
- Supporting habitat: food availability
- Supporting processes: physico-chemical properties
- Supporting processes: sediment movement and hydrodynamic regime
- Supporting processes: water quality – nutrients
- Supporting processes: water quality – turbidity

10.21.4. ASSESSMENT OF POTENTIAL ADVERSE EFFECTS ON SITE INTEGRITY

10.21.4.1. For those designated features where LSE could not be excluded, an assessment of potential adverse effects on site integrity is presented in Table 10.51 and Table 10.52 below.

10.21.4.2. It should be noted that proxy targets have not been used because targets are site-specific.

10.21.4.3. **It is concluded that there will be no adverse effects on site integrity for the Estuaire de la Seine SAC /** Marais Vernier Ramsar **from either the Proposed Development alone or the Proposed Development in combination with other plans or projects**.

Table 10.51 - Assessment of potential adverse effects on site integrity for Annex II fish species of the Estuaire de la Seine SAC/Marais Vernier Ramsar across all phases of the Proposed Development both alone and in combination with other plans and projects

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Twaite shad	The populations of qualifying species	Pollution events	Population: adult run size	N/A	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect twaite shad during their spawning migrations given their sensitivity to pollution. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
			Population: juvenile densities	N/A	
	The structure and function of the habitats of qualifying species		Supporting habitat: Biological connectivity	N/A	
	The supporting processes on which qualifying natural habitat and habitats of qualifying species rely		Supporting processes: Integrity of off-site habitats	N/A	
Salmon	The populations of qualifying species	Pollution events	Population: adult run size	N/A	Unplanned oil or chemical spillages from vessels may occur during all development phases. 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. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurring and therefore will not result in adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
			Population: juvenile densities	N/A	
	The structure and function of the habitats of qualifying species		Supporting habitat: biological connectivity	N/A	
	The supporting processes on which qualifying natural habitat and habitats of qualifying species rely		Supporting processes: integrity of off-site habitats	N/A	
River lamprey	The populations of qualifying species	Pollution events	Population: population abundance	N/A	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect both adult river lamprey and transformers during their spawning or seaward migrations given their sensitivity to pollution.
	Population: Juvenile densities		Population: Juvenile densities	N/A	

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
	The structure and function of the habitats of qualifying species		Supporting habitat: Biological connectivity	N/A	However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
			Supporting habitats: Integrity of off-site habitats	N/A	
Sea lamprey	The populations of qualifying species	Pollution events	Population: Population abundance	N/A	Unplanned oil or chemical spillages from vessels may occur during all development phases. Spills have the potential to directly affect both adult sea lamprey and transformers during their spawning or seaward migrations given their sensitivity to pollution. However, routine mitigation measures of standard best practice in terms of waste management, pollution prevention measures (Section 10.2.5) and strict navigational protocols will prevent these events occurringand therefore will not result in adverse effects on site integrity from the Proposed Development alone. Given the scale and nature of other potential plans and projects and the requirement to adhere to similar best practice measures which could contribute to in combination effects, it is predicted that there will be no adverse effect on site integrity in combination with other plans and projects.
			Population: Juvenile densities	N/A	
	The structure and function of the habitats of qualifying species		Supporting habitat: Biological connectivity	N/A	
			Structure and function: Supporting off-site habitat	N/A	
Conclusion: No adverse effect on site integrity can be concluded for the Estuaire de la Seine ZSC/Marais Vernier Ramsar arising from either the Proposed Development alone, or in combination with other plans or projects.					

Table 10.52 - Assessment of potential adverse effects on site integrity for the Estuaire de la Seine SAC across all phases of the Proposed Development both alone and in combination with other plans or projects

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Harbour porpoise	Maintain or restore: The extent and distribution of qualifying natural habitats and habitats of the qualifying species; The structure and function (including typical species) of qualifying natural habitats; The structure and function of the habitats of the qualifying species; The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; The populations of each of the qualifying species; and The distribution of qualifying species within the site.	Pollution	NA	NA	Mitigation included in the dML requires that the best practice plans and procedures for preventing pollution events are followed during delivery of the Proposed Project (see section 10.2.5). In the unlikely event of pollution events occurring, the same mitigation outlines procedures and responsibilities for effectively managing any events. Similar best practice measures are employed for the other plans and projects identified which could contribute to in combination effects. Therefore, it is concluded that adhering to mitigation measures will ensure that there will be no adverse effects on site integrity, either alone or in combination with other plans or projects.
Grey seal		Pollution	Supporting processes: water quality - contaminants	NA	
Harbour seal		Pollution	Supporting processes: water quality - contaminants	NA	
Conclusion: No adverse effect on site integrity can be concluded for the Estuaire de la Seine SAC arising from either the Proposed Development alone, or in combination with other plans or projects.					

10.22. MARINE: RÉCIFS GRIS-NEZ BLANC-NEZ SAC

10.22.1. OVERVIEW

10.22.1.1. Harbour porpoise, grey seal and harbour seal are qualifying features of the Récifs Gris-Nez Blanc-Nez SAC which is approximately 104 km from the Proposed Development at its closest point.

10.22.2. CONSERVATION OBJECTIVES (TARGETS AND ATTRIBUTES)

10.22.2.1. Site-specific SACO is not currently available for this site. As such, the following information was used for each species:

- Harbour porpoise: Southern North Sea SAC Conservation Advice and Advice on Operations document[87];
- Grey seal: Pembrokeshire Marine SAC document[88] and the SACOs page of Natural England's Designated Sites View website for the Humber SAC[89]; and
- Harbour seal: SACOs page of Natural England's Designated Sites View website for The Wash and North Norfolk Coast SAC[90].

10.22.2.2. Table 10.53 lists those attributes considered to be equivalent to those impacts for which an LSE could not be excluded (i.e. pollution). No attributes were listed for either the proxy or other UK sites for harbour porpoise.

Table 10.53 - SACO attributes screened in for assessment

Feature	Impact for which LSE could not be excluded	Equivalent attribute
Harbour porpoise	Pollution	NA
Grey seal	Pollution	Supporting processes: water quality - contaminants
Harbour seal	Pollution	Supporting processes: water quality - contaminants

10.22.2.3. The following non-equivalent attributes listed within the SACOs were screened out from further assessment:

87 http://jncc.defra.gov.uk/pdf/SNorthSea_ConsAdvice.pdf
88 https://cdn.naturalresources.wales/media/687999/eng-pembrokeshire-marine-reg-37-report-2018.pdf?mode=pad&rnd=131929024980000000
89 https://designatedsites.naturalengland.org.uk/
90 https://designatedsites.naturalengland.org.uk/

- Population: population size
- Population: recruitment and reproductive capability
- Presence and spatial distribution of the species
- Structure and function: biological connectivity
- Structure: Non-native species and pathogens
- Supporting habitat: extent and distribution
- Supporting habitat: food availability
- Supporting processes: physico-chemical properties
- Supporting processes: sediment movement and hydrodynamic regime
- Supporting processes: water quality – nutrients
- Supporting processes: water quality – turbidity

10.22.3. ASSESSMENT OF POTENTIAL ADVERSE EFFECTS ON SITE INTEGRITY

10.22.3.1. For those designated features where LSE could not be excluded, an assessment of potential adverse effects on site integrity is presented in Table 10.54 below.

10.22.3.2. It should be noted that proxy targets have not been used because targets are site-specific.

10.22.3.3. It is concluded that there will be no adverse effects on site integrity for the Récifs Gris-Nez Blanc-Nez SAC from either the Proposed Development alone or the Proposed Development in combination with other plans or projects.

Table 10.54 - Assessment of potential adverse effects on site integrity for the Récifs Gris-Nez Blanc-Nez SAC across all phases of the Proposed Development both alone and in combination with other plans or projects

Feature	Conservation Objectives	Effect	Attribute	Target	Assessment
Harbour porpoise	Maintain or restore: The extent and distribution of qualifying natural habitats and habitats of the qualifying species; The structure and function (including typical species) of qualifying natural habitats; The structure and function of the habitats of the qualifying species; The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely; The populations of each of the qualifying species; and The distribution of qualifying species within the site.	Pollution	NA	NA	Mitigation included in the dML requires that the best practice plans and procedures for preventing pollution events are followed during delivery of the Proposed Development (see section 10.2.5). In the unlikely event of pollution events occurring, the same mitigation outlines procedures and responsibilities for effectively managing any events. Similar best practice measures are employed for the other plans and projects identified which could contribute to in combination effects. Therefore, it is concluded that adhering to mitigation measures will ensure that there will be no adverse effects on site integrity, either alone or in combination with other plans and projects.
Grey seal		Pollution	Supporting processes: water quality - contaminants	NA	
Harbour seal		Pollution	Supporting processes: water quality - contaminants	NA	
Conclusion: No adverse effect on site integrity can be concluded for the Récifs Gris-Nez Blanc-Nez SAC arising from either the Proposed Development alone, or in combination with other plans or projects.					

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